



88048433



U.S. Department of the Interior
Bureau of Land Management

Salem District Office
1717 Fabry Road SE
Salem, Oregon 97306

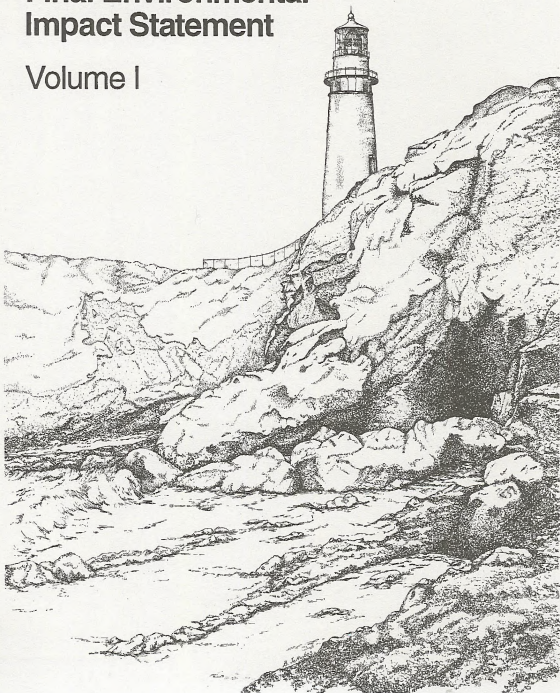
FINAL

September 1994



Salem District Proposed Resource Management Plan/ Final Environmental Impact Statement

Volume I



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

BLM/OR/WA/ES-94/32+1792

ID: 88048433

QH
76.5
107
S254
1994
V.1
C.2



UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Salem District Office
1717 Fabry Road SE
Salem, Oregon 97306

In Reply Refer to:
1617 (933)

September 1994

Dear Public Land User:

Enclosed for your review and comment is the Salem District Proposed Resource Management Plan/Final Environmental Impact Statement. The Bureau of Land Management has prepared this document in partial fulfillment of its responsibilities under the Federal Land Policy and Management Act of 1976 and the National Environmental Policy Act of 1969.

The proposed resource management plan/final environmental impact statement is designed to stand alone from the draft resource management plan/environmental impact statement which was published in August 1992. However, you may find the draft resource management plan/environmental impact statement to be a useful reference document.

The public devoted substantial effort to providing in-depth input on the draft resource management plan/environmental impact statement. The Salem District received 783 individual comment letters containing over 1,670 specific comments. The planning team has assessed these comments and utilized the input in making substantive changes in the proposed resource management plan and strengthening the environmental impact statement. We sincerely appreciate the efforts of those who took the time to provide us with their comments. We feel that your efforts have resulted in a stronger and clearer plan.

This proposed resource management plan/final environmental impact statement contains a summary comparison of the alternatives analyzed in depth, an introduction, a description of the proposed plan and other alternatives analyzed, an affected environment description, the environmental consequences of the proposed plan and other alternatives, substantive (more than opinion) public comments received on the draft resource management plan/environmental impact statement, and our response to those comments. The preferred alternative in the draft resource management plan has been revised as a result of public comment, internal review, and the decisions made by the secretaries of the Departments of Interior and Agriculture following completion of the *Supplemental Environmental Impact Statement on Management of Habitat for Species Within the Range of the Northern Spotted Owl*. This revision has become the proposed resource management plan which reflects these changes in the refinement of management objectives and in management actions.

If you desire assistance in understanding this document, you may contact Resource Management Plan Team Leader Bob Saunders at (503) 375-5634. Informal public meetings will also be held to discuss and explain the proposed plan. The times and locations of these meetings will be announced in local newspapers and in a Salem District progress report.

If you would like me to further consider your interests/concerns as I make the final decisions which will guide the management of the public lands in the planning area for the next ten to fifteen years, please identify them in writing 30 days after the Environmental Protection Agency publishes its Notice of Availability in the Federal Register.

Comments should be sent to: District Manager
Bureau of Land Management
Salem District Office
1717 Fabry Road SE
Salem, Oregon 97306

BLM LIBRARY
RIS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

The final decisions will be based on the analysis in the environmental impact statement, any additional data available, public input, management feasibility, policy, and legal constraints. Approval of the plan will be documented in a record of decision which will be made available to the public and mailed to all parties who were mailed this document or the summary. Resource management plan implementation usually involves further analysis and decision making, including public involvement and allows for protest of adverse decisions under 43 Code of Federal Regulations Parts 4 and 5000.

The resource management planning process includes an opportunity for administrative review via a plan protest to the BLM director if you believe the approval of a proposed resource management plan would be in error under 43 Code of Federal Regulations 1610.5-2. Careful adherence to these guidelines will assist in preparing a protest that will assure the greatest consideration to your point of view.

Only those persons or organizations who participated in our planning process leading to this proposed resource management plan may protest. If our records do not indicate that you had any involvement in any stage in the preparation of the proposed Salem District resource management plan, your protest will be dismissed without further review. A protest must also be limited to a single proposed resource management plan, even if the issue or concern involves more than one proposed resource management plan. Protests that challenge proposed decisions in more than one proposed resource management plan will not be accepted by the director. In effect, if you may be adversely affected by more than one resource management plan you must file an individual protest for each resource management plan citing why and where that particular resource management plan is incorrect or not in compliance with existing laws, regulations, etc.

Protests of proposed plan elements that merely adopt decisions made in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* signed by the secretary of the Department of the Interior will be dismissed, as the director will not overturn a decision which the secretary has already directed to be adopted in BLM's new resource management plans.

A protesting party may raise only those issues which he or she submitted for the record during the planning process. New issues identified during the protest period should be directed to the district manager for consideration during plan implementation, as potential plan amendments, or as otherwise appropriate. If an issue is shared by several individuals or landowners or interest groups, a combined protest on the common neighborhood issue or concern may be mutually more efficient and effective. For example, several landowners in a portion of the planning area may wish to combine their concerns on a proposed land allocation or management issue that affects their common interests in a given watershed.

The period for filing a plan protest begins when the Environmental Protection Agency publishes in the Federal Register its Notice of Availability of the final environmental impact statement concerning the proposed resource management plan or amendment. The protest period extends for 30 days after publication of the Notice of Availability. There is no provision in BLM's regulations for any extension of time, and no extensions for filing protests will be granted. To be considered "timely," your protest must be postmarked no later than the last day of the protest period. Although not a requirement, we suggest that you send your protest by certified mail, return receipt requested.

Protests must be filed in writing to:

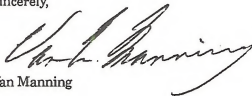
Director (760)
Chief, Planning and Environmental Coordination
Bureau of Land Management
1849 C Street NW
Washington D.C. 20240

To be considered complete, your protest must contain, at a minimum, the following information:

- The name, mailing address, telephone number, and interest of the person filing the protest.
- A statement of the issue or issues being protested.
- A statement of the part or parts of the specific (named) proposed resource management plan being protested. To the extent possible, this should be done by reference to specific pages, paragraphs, sections, tables, maps, etc., included in the document.
- A copy of all documents addressing the issue or issues that you submitted during the planning process or a reference to the date the issue or issues were discussed by you for the record.
- A concise statement explaining why the BLM state director's decision is believed to be incorrect. This is a critical part of your protest. Document all relevant facts. As much as possible, reference or cite the planning documents, environmental analysis documents, and available planning records (e.g., meeting minutes or summaries, or correspondence). A protest which merely expresses disagreement with the Oregon/Washington state director's proposed decision, without any data, will not provide us with the benefit of your information and insight. In this case, the director's review will be based on the existing analysis and supporting data.
- Before deciding to file a protest, I encourage you to contact me or the proposed resource management plan team leader to determine if your concerns might be met in some way other than via a protest or to assist you in the protest process if it is appropriate.

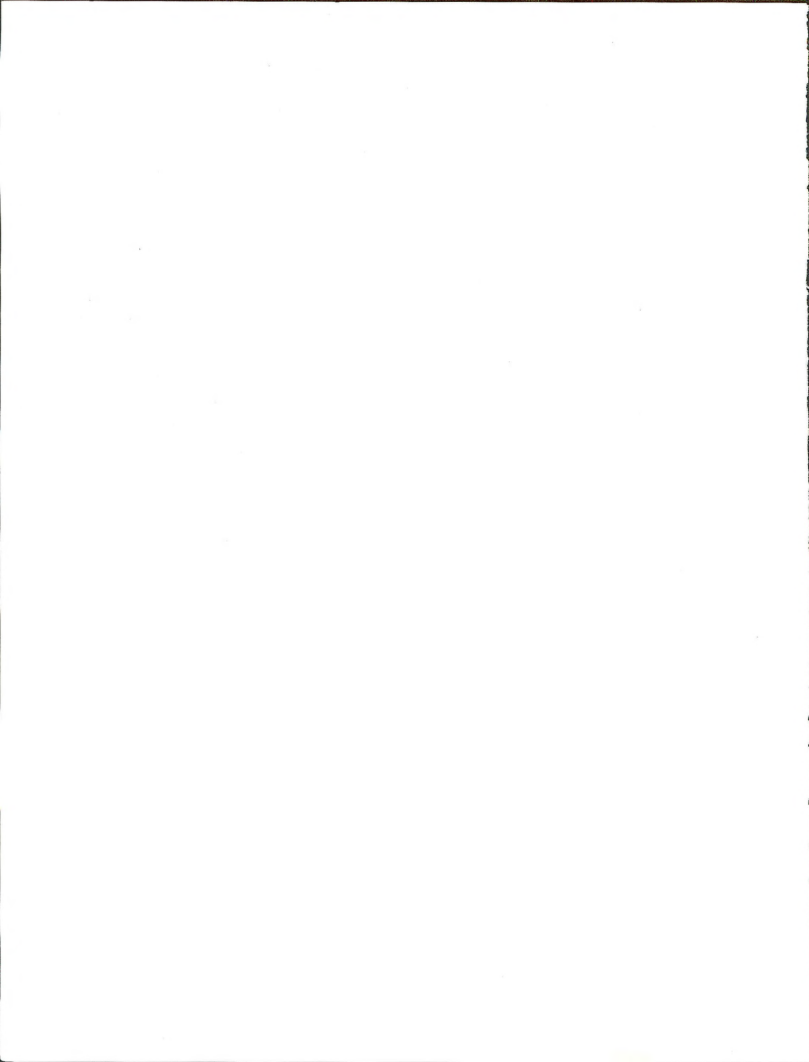
Thank you for your continued interest in the multiple use management of your public lands.

Sincerely,

A handwritten signature in dark ink, appearing to read "Van Manning", with a long, sweeping underline that extends to the right.

Van Manning

District Manager
Salem District, Oregon

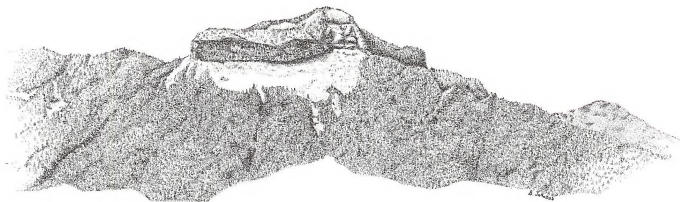


U.S. Department of the Interior
Bureau of Land Management

Final
Salem District
**Proposed Resource Management Plan
and
Final Environmental Impact Statement**

Prepared by
Salem District Office

September 1994



Elaine Zielinski

Elaine Zielinski
State Director, Oregon/Washington

Van Manning

Van Manning
District Manager, Salem District

Draft () Final (x) Proposed Resource Management Plan
Department of the Interior
Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ().
2. Abstract: This proposed resource management plan/final environmental impact statement addresses resource management on 398,100 acres of federal land and 27,800 acres of reserved mineral estate administered by the Bureau of Land Management (BLM) in its Salem District. The proposed resource management plan responds to the need for a healthy forest ecosystem with habitat that will support populations of native species (particularly those associated with late-successional and old-growth forests). It also responds to the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies, and contribute valuable resources to the national economy on a predictable and long-term basis. BLM-administered lands are primarily allocated to Riparian Reserves, Late-Successional Reserves, an Adaptive Management Area, Connectivity/Diversity Blocks, and General Forest Management Areas. An Aquatic Conservation Strategy would be applied to all lands and waters under BLM jurisdiction. Seven additional areas of critical environmental concern would be designated, two river segments would be found suitable for designation under the Wild and Scenic Rivers Act, and recreation facilities would be provided at key locations.
3. The protest and comment period will end 30 days after the Environmental Protection Agency publishes its Notice of Availability in the Federal Register.
4. For further information contact:
Bob Saunders
Resource Management Plan/Environmental
Impact Statement Team Leader
Bureau of Land Management
Salem District Office
1717 Fabry Road SE
Salem, Oregon 97306
Telephone: (503) 375-5634 or 375-5646

Table of Contents

Volume I

User's Guide	U-1
Summary of the Proposed Management Plan/Final Environmental Impact Statement	S-1

Chapter 1 - Introduction

Major Changes from Chapter 1 of the Draft Resource Management Plan	1-1
The Planning Area	1-1
Purpose and Need	1-1
Relationship of the Resource Management Plan to BLM Policies, Programs, and Other Plans	1-3
Planning Process and Criteria	1-4
Issues and Concerns and Other Planning Considerations Eliminated from Detailed Study	1-4
Western Oregon Digital Data Base	1-6

Chapter 2 - Description of the Alternatives

Major Changes from Chapter 2 of the Draft Resource Management Plan	2-1
Alternatives to be Analyzed and Alternatives Dropped from Detailed Study	2-1
Introduction	2-1
The Proposed Resource Management Plan	2-1
Ecological Principles for Management of Late-Successional Forests	2-16
Aquatic Conservation Strategy	2-17
Land Use Allocations and Resource Programs	2-19
Management Actions/Direction for All Major Land Use Allocations and Resource Programs	2-19
Major Land Use Allocations	2-20
Riparian Reserves	2-21
Late-Successional Reserves	2-27
Adaptive Management Area	2-31
Matrix	2-32
Resource Programs	2-34
Air Quality	2-34
Water and Soils	2-34
Wildlife Habitat	2-37
Fish Habitat	2-40
Special Status and SEIS Special Attention Species and Habitat	2-41
Special Areas	2-46
Cultural Resources Including American Indian Values	2-49
Visual Resources	2-50

Wild and Scenic Rivers	2-50
Wilderness	2-52
Rural Interface Areas	2-52
Socioeconomic Conditions	2-54
Recreation	2-54
Timber Resources	2-59
Special Forest Products	2-61
Energy and Minerals	2-63
Land Tenure Adjustment	2-66
Rights-of-Way	2-68
Access	2-69
Withdrawals	2-70
Roads	2-75
Noxious Weeds	2-77
Hazardous Materials	2-77
Fire/Fuels Management	2-78
Management Direction Common to Alternatives A through E	
General	2-80
Water Quality and Riparian Zones	2-81
Timber	2-82
Special Status Species Habitat	2-86
Special Areas	2-87
Recreation	2-87
Wild and Scenic Rivers	2-88
Wilderness	2-88
Visual Resources	2-88
Cultural Resources Including American Indian Values	2-89
Land Tenure	2-90
Rights-of-Way	2-91
Access	2-91
Withdrawals	2-92
Energy and Minerals	2-92
Roads	2-93
Noxious Weeds	2-93
Hazardous Materials	2-94
Fire	2-94
Wildfire Suppression	2-94
Management Direction by Alternative	
Introduction	2-95
No Action Alternative	2-95
Alternative A	2-96
Alternative B	2-97
Alternative C	2-99
Alternative D	2-103
Alternative E	2-105

Coordination and Consultation	2-107
Use of the Completed Plan	2-108
Adaptive Management	2-109
Watershed Analysis	2-111
Requirement for Further Environmental Analysis	2-112
Management Assessments and Plans	2-114
Management of Newly Acquired Lands	2-114
Costs of Management	2-115
The Budget Link	2-115
Monitoring	2-115
Research	2-117

Chapter 3 - Affected Environment

Major Changes from Chapter 3 of the Draft Resource Management Plan	3-1
Introduction	3-2
Climate	3-2
Topography and Geology	3-2
Lands and Transportation	3-3
Air Resources	3-5
Soils	3-9
Water Resources	3-9
Biological Diversity and Ecological Health	3-23
Vegetation Including Special Forest Products	3-29
Riparian Zones	3-35
Wildlife Habitat	3-36
Fish Habitat	3-39
Special Status and SEIS Special Attention Species and Habitat	3-41
Special Areas	3-55
Cultural Resources Including American Indian Values	3-59
Visual Resources	3-60
Wild and Scenic Rivers	3-60
Wilderness	3-62
Recreation	3-63
Timber Resources	3-71
Energy and Mineral Resources	3-78
Socioeconomic Conditions	3-79
Rural Interface Areas	3-87
Fire/Fuels Management	3-88

Chapter 4 - Environmental Consequences

Major Changes from Chapter 4 of the Draft Resource Management Plan	4-1
Introduction	4-2
Incomplete or Unavailable Information	4-5
Mitigation	4-6
Effects on Global Climate	4-7
Effects on Air Quality	4-8
Effects on Soils	4-11
Effects on Water Resources	4-14
Effects on Biological Diversity and Ecological Health	4-19
Effects on Vegetation Including Special Forest Products	4-26
Effects on Riparian Zones	4-28
Effects on Wildlife Habitat	4-29
Effects on Fish Habitat	4-39
Effects on Special Status and SEIS Special Attention Species and Habitat	4-41
Effects on Special Areas	4-60
Effects on Cultural Resources Including American Indian Values	4-62
Effects on Visual Resources	4-62
Effects on Wild and Scenic Rivers	4-64
Effects on Recreation	4-67
Effects on Timber Resources	4-70
Effects on Energy and Mineral Resources	4-80
Effects on Socioeconomic Conditions	4-83
Effects on Rural Interface Areas	4-93
Effects on Wildfire	4-94
Consistency with Other Agency Plans and Programs	4-96

Chapter 5 - Consultation and Coordination

Major Changes from Chapter 5 of the Draft Resource Management Plan	5-1
Introduction	5-1
Summary of Public Comments on the Draft Resource Management Plan	5-1
Summary of Public Comments on the Draft Supplemental Environmental Impact Statement	5-1
List of Agencies and Organizations Contacted and to Whom Copies of the Draft Resource Management Plan Have Been Sent	5-2
Protest Process	5-4
Consistency Review	5-4

Chapter 6 - Glossary, References Cited, and List of Preparers

Glossary	6-1
References Cited	6-19
List of Preparers	6-33

Index

Tables

Chapter 1

Table 1-1	BLM-Administered Land in the Planning Area	1-1
-----------	--	-----

Chapter 2

Table 2-1	Comparison of Allocations and Management Actions by Alternative	2-2
Table 2-2	Management of Proposed Special Areas	2-47
Table 2-3	Managed Rural Interface Areas	2-53
Table 2-4	Leasable Mineral Lease Restrictions	2-64
Table 2-5	Locatable Mineral Restrictions	2-64
Table 2-6	Salable Mineral Restrictions	2-64
Table 2-7	Land Withdrawals and Recommendations to Maintain or Revoke	2-71
Table 2-8	Land Classifications	2-74

Chapter 3

Table 3-1	Miles of BLM-Controlled Roads (May 1993)	3-4
Table 3-2	Average Biomass Consumption Estimates	3-7
Table 3-3	Prescribed Fire Use Based on Total Available Harvest Acres	3-8
Table 3-4	Smoke Intrusions in the Willamette Valley	3-8
Table 3-5	Fragile Nonsuitable Woodland	3-10
Table 3-6	Fragile Suitable, Restricted	3-10
Table 3-7	Salem District Analytical Watersheds	3-12
Table 3-8	Selected Analytical Watersheds	3-14
Table 3-9	Water Yield and Flow Data for Selected Analytical Watersheds	3-17
Table 3-10	Community Water Systems	3-19
Table 3-11	Acres of Major Plant Groupings and Seral Stages	3-24
Table 3-12	Species Composition in Mature and Old-Growth Stands	3-25
Table 3-13	Structural Characteristics of Seral Stages	3-26
Table 3-14	Downed Logs in Conifer Stands	3-27
Table 3-15	Causes and Rates of Tree Mortality on BLM-administered Lands	3-27
Table 3-16	Existing Older Forest Blocks	3-28
Table 3-17	Dominant Seral Vegetation by Seral Stage and Major Plant Grouping	3-31
Table 3-18	Partial List of Special Forest Products on BLM-Administered Lands	3-33
Table 3-19	Special Forest Products Sold Under Contract on the Salem District During Fiscal Years 1989-1993	3-34
Table 3-20	Existing Conditions of Riparian Zones on BLM-Administered Lands	3-35
Table 3-21	Priority Animal Species in the Planning Area	3-37
Table 3-22	Salmon and Trout Conditions and Populations	3-40
Table 3-23	Special Status Species - Plants (August 1993)	3-41
Table 3-24	Special Status Species - Animals (August 1993)	3-45
Table 3-25	Stocks At Risk in the Salem District	3-55
Table 3-27	Existing Special Areas	3-56
Table 3-28	Potential Special Areas	3-58
Table 3-29	Potential Special Areas Other Than Areas of Critical Environmental Concern	3-59

Tables (continued)

Table 3-30	Designated Wild, Scenic, and Recreational River Areas	3-61
Table 3-31	Wild and Scenic River Segments Assessed for Suitability	3-62
Table 3-32	Existing Special Recreation Management Areas	3-64
Table 3-33	Potential Special Recreation Management Areas	3-65
Table 3-34	Existing Recreation Sites	3-66
Table 3-35	Potential Recreation Sites	3-67
Table 3-36	Existing Recreation Trails	3-68
Table 3-37	Potential Recreation Trails	3-69
Table 3-38	1993 Recreation Visits to BLM-Administered Lands in the Salem District	3-70
Table 3-39	Timber Management and Forest Development	3-72
Table 3-40	Timber Production Capability Classification, January 1993	3-73
Table 3-41	Comparison of Salem District Inventory of Conifer Stands	3-74
Table 3-42	Comparison of Salem District Inventory of Hardwood Stands	3-75
Table 3-43	Forest Area and Growing Stock by Owner and Timbershed (1989)	3-76
Table 3-44	Volume Harvested in Counties Within the Salem District Planning Area 1983-1992	3-77
Table 3-45	Mineral Potential in the Planning Area	3-78
Table 3-46	Population Trend Summary	3-81
Table 3-47	Unemployment Rates in Counties and Metropolitan Statistical Areas	3-81
Table 3-48	Personal Income (dollars/capita)	3-82
Table 3-49	BLM O&C Payments Made to Counties	3-83
Table 3-50	Per Capita BLM O&C Payments Made to Counties	3-84
Table 3-51	BLM Payments in Lieu of Taxes Made to Counties	3-85
Table 3-52	Federal Timber Revenues and County Budgets, 1990	3-85
Table 3-53	Forest Products Harvest Tax Rates Applicable to BLM Timber Purchasers	3-85
Table 3-54	BLM Acres in Rural Interface Areas	3-87
Table 3-55	Distribution of Fires by Size Class, 1984-1993	3-90

Chapter 4

Table 4-1	Estimated First-Decade Annual Levels of Timber Management Activity	4-4
Table 4-2	Fragile Restricted Areas Possibly Harvested by Alternative	4-12
Table 4-3	Expected Changes in Components of Biological Diversity by Alternative in the Short Term (10 years) and Long Term (100 years)	4-20
Table 4-4	Effects of the Alternatives on the Availability of Individual Special Forest Products Being Harvested	4-27
Table 4-5	Estimated Condition of Riparian Zones	4-28
Table 4-6	Assessment of Short-Term Impacts on Elk Habitat in the Planning Area	4-32
Table 4-7	Estimated Percent of Optimum Potential Population Levels of Dominant Woodpeckers	4-34
Table 4-8	Estimated Effects of Alternatives on Other Priority Wildlife Species	4-35
Table 4-9	Impacts on Cooper's and Sharp-shinned Hawks	4-35
Table 4-10	Estimated Short-Term Effects of Alternatives on Special Status Plants	4-42
Table 4-11	Stand Ages or Period After Regeneration Timber Harvest, When Spotted Owl Habitat is Attained	4-45
Table 4-12	Suitable Spotted Owl Habitat by Alternative	4-46

Table 4-13	Suitable Spotted Owl Habitat on Forest Service Lands and on BLM-Administered Lands by Alternative	4-48
Table 4-14	Impacts on Marbled Murrelets	4-53
Table 4-15	Impacts to Other Special Status Animal Species During the Short Term and Long Term by Alternative	4-55
Table 4-16	Possible Changes in the Condition of Existing and Potential Special Areas in the Short Term	4-61
Table 4-17	Probable Changes in Visual Resource Conditions in the Short Term	4-63
Table 4-18	Probable Short-Term Changes in Outstandingly Remarkable Value Conditions for River Segments Assessed Under Each Alternative	4-66
Table 4-19	Anticipated Short-Term Capability of BLM-Administered Facilities and Resources to Meet Projected Recreational Demand for 11 Major Use Categories by Alternative	4-68
Table 4-20	Probable Sale Quantity of the Alternatives and Board Foot Equivalent	4-71
Table 4-21	Estimated Annual Miles and Acres of New Road Construction	4-73
Table 4-25	Salem District Timber Harvest	4-78
Table 4-26	Western Oregon Timber Harvest	4-79
Table 4-22	Leasable Mineral Restrictions (acres) by Alternative	4-81
Table 4-23	Locatable Mineral Restrictions (acres) by Alternative	4-82
Table 4-24	Salable Mineral Restrictions (acres) by Alternative	4-82
Table 4-27	Summary of Measurable Annual Outputs by Alternative	4-84
Table 4-28	Estimated Dependent Personal Income and Employment, Salem District BLM	4-86
Table 4-29	Estimated Dependent Personal Income and Employment, Western Oregon BLM	4-88
Table 4-30	Projected O&C Payments to Counties Attributable to Timber Harvest in Western Oregon	4-89

Figures

Chapter 2

Figure 2-1	Riparian Management Area	2-23
Figure 2-2	Timber Production Capability Classification Categories	2-36
Figure 2-3	Alternative C Design Illustration	2-100
Figure 2-4	Process for Changing the Resource Management Plan	2-110
Figure 2-5	Basic Adaptive Management Model	2-111

Chapter 3

Figure 3-1	Seral Stages	3-30
------------	--------------------	------

Chapter 4

Figure 4-1	Biomass Consumption	4-9
Figure 4-2	Forest Seral Stages (10 years)	4-22
Figure 4-3	Forest Seral Stages (100 years)	4-22

Maps (Located in accompanying map packet)

Chapter 1

- Map 1-1 General Location
- Map 1-2 Land Status

Chapter 2

- Map 2-1 Western Oregon Planning Strategy
- Map 2-2a Salem District Planning Strategy
- Map 2-2b Salem District Planning Strategy (Reserves)
- Map 2-3 Proposed Special Areas
- Map 2-4 Visual Resource Management Classes
- Map 2-5 Existing and Suitable Wild, Scenic and/or Recreational Rivers,
Wilderness Areas and Wilderness Study Areas and Instant Study Areas
- Map 2-6 Rural Interface Areas
- Map 2-7 Existing and Proposed Recreation Sites, Areas, Trails and
National Back Country Byways
- Map 2-8 Land Tenure Zones
- Map 2-9 Communication Sites and Utility Rights-of-Way Sites
- Map 2-10 Statewide Comprehensive Outdoor Recreation Plan (SCORP)
Geographic Regions for Oregon

Chapter 3

- Map 3-1 Sensitive Air Quality Areas
 - Map 3-2 Analytical Watersheds
 - Map 3-3 Community Watersheds
 - Map 3-4 Seral Stages and Major Plant Groupings
 - Map 3-5 Spotted Owl Sites
 - Map 3-6 Existing and Potential Special Areas
 - Map 3-7 Visual Resource Management Classes
 - Map 3-8 Existing and Eligible Wild, Scenic and/or Recreational Rivers
 - Map 3-9 Existing and Potential Recreation Sites/Areas, Trailheads, Wilderness
and National Back Country Byways
 - Map 3-10 Coal and Locatable Minerals Potential
 - Map 3-11 Oil and Gas Geothermal Potential
 - Map 3-12 Inventoried Rural Interface Areas
-

User's Guide

Volume I

Summary This presents a synopsis of the proposed resource management plan/final environmental impact statement, hereinafter referred to as the proposed resource management plan. It summarizes all alternatives but presents more detail for the proposed resource management plan. It also summarizes the land use allocations for all issues and includes brief descriptions of environmental consequences, monitoring, consistency with other government entities, and public involvement.

Chapter 1 - Introduction to the Proposed Resource Management Plan

This chapter includes a description of the planning area and the purpose and need for preparing this document. It also includes a discussion of the proposed resource management plan's relationship to BLM policies, programs, and other plans, and describes the planning process and planning criteria. Finally, it identifies the issues or concerns addressed in the proposed resource management plan.

Chapter 2 - Description of the Proposed Resource Management Plan and Alternatives This chapter has four major sections - the proposed resource management plan, management direction common to alternatives A through E, management direction by alternative (except the proposed resource management plan), and management direction common to all alternatives. The first section is particularly important to understanding how lands would be managed under the proposed resource management plan. The chapter also describes six different alternatives (no action, A, B, C, D, and E). The alternatives provide a mix of uses and actions, which could resolve issues identified in chapter 1. This chapter includes a tabular summary of the alternatives so they can be compared (see table 2-1). It also includes maps displaying the major land use allocations for proposed resource management plan. These maps are located in a map packet accompanying this document.

Chapter 3 - Affected Environment This chapter describes the existing environment that could be affected or changed by implementing the proposed resource management plan or any of the alternatives. It includes a description of the environmental factors (water resources, vegetation, wildlife habitat, visual resources etc.) and major uses (recreation, timber, etc.) related to the issues.

Chapter 4 - Environmental Consequences

This chapter describes potential impacts and changes to the affected environment if the proposed resource management plan or any of the alternatives were implemented. It includes an overview of each alternative's relationship to plans and programs of other government agencies.

Chapter 5 - Consultation and Coordination

This chapter identifies agencies and organizations BLM has worked with during preparation of the draft resource management plan/environmental impact statement and the proposed resource management plan/final environmental impact statement. It discusses relevant relationships with other agencies and the protest process available to the public.

Chapter 6 - Glossary, References, and List of Preparers

The Glossary defines terms frequently used in the text of this document.

References contain a list of publications cited in the text of this document.

The List of Preparers includes members of the resource management plan/environmental impact statement team and other preparers, reviewers, and contributors to this document.

Other Specific Guidance for Reviewers of the Proposed Resource Management Plan

A Table of Contents is included at the beginning of each volume and each chapter of the proposed resource management plan for the reader's convenience.

Major changes from the draft resource management plan which have been incorporated into this proposed resource management plan are listed at the beginning of each chapter.

In response to public comment, use of acronyms was kept to a minimum in this document.

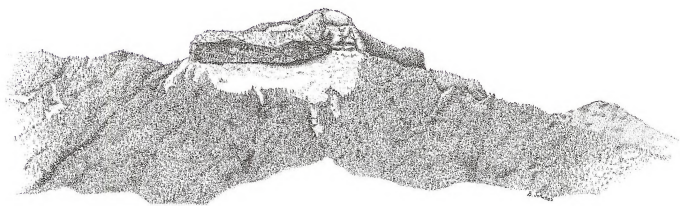
Maps referred to in this document are included in a separate packet.

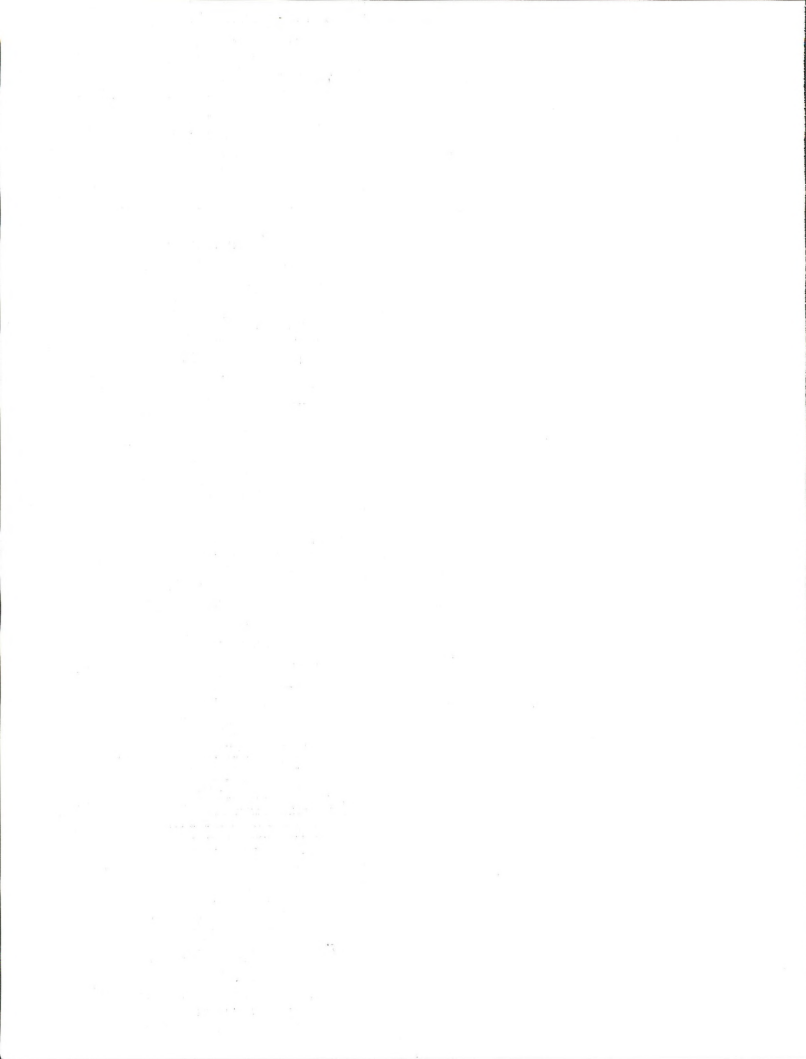
Volumes II and III

Appendices These are a collection of more detailed supplementary material that provide supporting documentation to the chapters in volume I of the proposed resource management plan. The appendices in Volume III contain comments/responses to the draft resource management plan and letters from government officials.

**Salem District
Proposed Resource
Management Plan/
Final Environmental
Impact Statement**

Summary





Introduction

The Bureau of Land Management (BLM) Salem District Resource Management Plan will establish guidelines for the management of BLM-administered lands in the district for at least ten years. It will supersede and replace two management framework plans covering the same area, completed in 1983.

The proposed resource management plan/final environmental impact statement (hereinafter referred to as the proposed resource management plan) has been prepared in accordance with the BLM planning regulations issued under authority of the Federal Land Policy and Management Act and written in accordance with Council on Environmental Quality regulations issued under authority of the National Environmental Policy Act.

There are approximately 398,100 acres of BLM-administered lands in the planning area of which 344,500 acres are Oregon and California Revested Railroad lands and 53,600 acres are public domain lands. The Salem District administers the subsurface mineral estate on 27,800 acres of nonfederal land.

Alternatives

Seven alternatives have been developed to provide a range of responses to major issues identified earlier in the planning process. The issue topics are: timber production practices; old-growth forests; habitat diversity; threatened and endangered species habitat; special areas; visual resources; stream, riparian and water quality protection; recreation resources, including wild and scenic rivers; land tenure; and rural interface areas. Of particular interest is whether or not to harvest the remaining old-growth forests and the related effects on regional and local economies, biological diversity, and the northern spotted owl, a federally listed threatened species.

Each alternative offers a possible broad course of action that, if selected, would provide guidelines for future, more specific decisions. Site-specific management for various resources, annual timber sale plans, and issuance of rights-of-way, leases or permits will follow the guidelines identified in the resource management plan.

Selected land use or resource allocations of the alternatives are compared in table S-1, found at the end of the summary. Analysis of effects of each alternative except no action and the proposed resource management plan has been facilitated by development of ten-year representative timber

management scenarios. These reflect possible timber harvest units, roads and timber management practices during the first ten years of the resource management plan. These scenarios include different levels of forest management practices (also shown in table S-1). Anticipated environmental consequences of the alternatives are summarized in table S-2, also located at the end of the summary.

A summary of the proposed resource management plan, the no action alternative, and alternatives A, B, C, D, and E follows. Maps of the proposed resource management plan are in the accompanying map packet.

Proposed Resource Management Plan

This alternative would emphasize ecosystem management. Resources would be managed with an emphasis on retention of late-successional forest, restoration and/or maintenance of watershed conditions, and protection of special status and other species requiring special attention. A system of Late-Successional Reserves would be established. Connectivity/Diversity Blocks would be established to provide dispersal, foraging and/or support habitat and managed by growing forests on long rotations and retaining parts of the stands at harvest. Activities in the General Forest Management Area would emphasize production of timber, but a biological legacy of previous stands would be retained (e.g., green trees, snags and down coarse woody debris). Habitats of threatened and endangered species, species proposed for such status, species with a high potential for federal listing as threatened or endangered, and other species requiring special attention would be protected. Riparian Reserves would be established generally much wider than riparian zones. Management activities in Riparian Reserves would be guided by Aquatic Conservation Strategy objectives. All but one existing special area would be retained and nine new special areas would be designated. Two river segments would be found suitable for designation as recreational river area components of the national system. Visual resources would be protected in selected scenic and/or sensitive areas. Particular emphasis would be placed on scenic values in existing wild and scenic river corridors and along river segments found suitable for designation. Recreation management would provide a wide range of facility-dependent and dispersed recreation opportunities, with emphasis on dispersed activities. Special forest management practices would be considered for BLM-administered land in rural interface areas (i.e., one-half mile around 1 to 20-acre zoned areas or 40-acre plus zoned areas where appropriate).

No Action This alternative would not change the BLM management direction established in the current management framework plans. The exception is where Congress has enacted legislation prescribing different management direction for specific geographic areas or transferred specific lands to the administration or ownership of other parties. The no action alternative would emphasize the contribution of timber production to community stability consistent with a variety of other land uses. Large and small blocks of older forest would be retained to contribute to ecological functions important to timber productivity. Habitat of threatened and endangered species and species proposed for such status would be protected. Other special status species would be protected to the extent consistent with high timber production. Timber harvest would not be planned in riparian zones of important waters. All existing special areas, including areas of critical environmental concern would be retained. Scenic resources would be managed in accordance with 1983 visual resource management classes. Recreation management would provide a range of facility-dependent and dispersed recreation opportunities.

Alternative A This alternative would emphasize a high production of timber and other economically important values on all lands to contribute to community stability. It would produce the highest sustained yield of timber on all suitable forest lands legally available for harvest. It would manage threatened and endangered species habitat and habitats of species proposed for such status as legally required, and protect habitats of other species with high potential for listing known only to exist on BLM-administered lands. Riparian zones would be managed according to requirements of Oregon's adopted statewide water quality management plan for forest practices and water quality criteria and guidelines. This would meet legal requirements for protection of wetlands and water quality and protect anadromous fish habitat and other relevant values. Visual resources would be managed as inventoried in congressionally designated areas and other areas unavailable for timber management (e.g., extensive fragile areas and riparian management areas). Recreation management would provide existing high use recreation sites and trails and emphasize dispersed motorized recreation opportunities.

Alternative B This alternative would emphasize the contribution of timber production on Oregon and California Revested Railroad lands to community stability, consistent with a variety of other land uses. Public domain lands with nontimber values and uses of greater importance than timber production would be managed primarily for those values and uses.

A system of older forest seral stage blocks would be retained to contribute to ecological functions important to timber productivity. Habitat of threatened and endangered species and species proposed for such status would be protected. Other special status species would be protected to the extent consistent with high timber production. Timber harvest would not be planned in riparian zones of important waters. All existing special areas would be retained and four new areas designated. Three river segments would be found suitable for designation as recreational river area components of the National Wild and Scenic Rivers System. Visual resources would be managed as inventoried in selected scenic and/or sensitive areas and areas unavailable for timber management. Recreation management would provide a wide range of facility-dependent and dispersed recreation opportunities. Special forest management practices would be considered for BLM-administered lands in managed rural interface areas (i.e., one-quarter mile around one to five-acre zoned areas.)

Alternative C This alternative would emphasize retention and improvement of biological diversity while providing a sustained yield of timber to contribute to community stability. A system of old-growth and mature forest blocks would be established, focusing on the largest remaining areas of old-growth forest habitat. On lands available for timber production, biological diversity would be promoted by growing forests on long rotations, maintaining stands at low densities, and retaining parts of the stands at harvest. Habitats of threatened and endangered species, species proposed for such status, and species with a high potential for federal listing as threatened or endangered would be protected. Other special status species would be protected primarily through an emphasis on biological diversity. Timber harvest would not be planned in or immediately adjacent to riparian zones of important waters. All existing special areas would be retained and ten new areas would be designated. One river segment would be found suitable for designation as a scenic river area and three as recreational river areas of the national system. Visual resources would be protected in selected scenic and/or sensitive areas and in areas unavailable for timber harvest.

Particular emphasis would be placed on scenic values in existing wild and scenic river corridors and along river segments found suitable for designation. Recreation management would provide a wide range of facility-dependent and dispersed recreation opportunities, with emphasis on dispersed activities. Special forest management practices would be considered for BLM-administered lands in managed rural interface areas (i.e., one-quarter mile around 1 to 20-acre zoned areas.)

Alternative D This alternative would emphasize management for plant and animal habitat diversity, dispersed nonmotorized recreation opportunities, and scenic resources. It would include a variety of other resource values or uses including some timber production. Spotted owl habitat would be protected in accordance with the report titled *Conservation Strategy for the Northern Spotted Owl*. Other special status species would be protected. Timber harvest would not be planned in and adjacent to riparian zones of important waters or their immediate tributaries. All existing special areas would be retained and ten new areas designated. One river segment would be found suitable for designation as wild, two as scenic and four as recreational river area components of the national system. Visual resources would be managed as inventoried. Special timber harvest and forest management practices would be applied in managed rural interface areas (i.e., one-quarter mile around 1 to 20-acre zoned areas.)

Alternative E This alternative would emphasize protection of older forests and management and enhancement of values or uses such as dispersed, nonmotorized recreation opportunities and scenic resources. All forest stands 150 years and older and all suitable spotted owl habitat within two miles of known sites would be retained. Special status species would be protected. Timber harvest would not be planned in and adjacent to riparian zones. All existing special areas would be retained and eleven new areas designated. One river segment would be found suitable for designation as wild, two as scenic, and five as recreational river area components of the national system. Visual resources would be managed at levels higher than actual visual resource inventory classes (e.g., visual resource management class IV would be managed as visual resource management class III). Special timber harvest and forest management practices would be applied on BLM-administered lands in managed rural interface areas (i.e., one-half mile around 1 to 20-acre zoned areas.)

The Proposed Resource Management Plan

The proposed resource management plan was developed partially in response to public comments related to the BLM's August 1992 draft resource management plans for western Oregon. In addition the proposed plan incorporates the land use allocations and management direction from the 1994 *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and its attachment A (hereinafter referred to as the record of decision).

Vision

The BLM will manage the natural resources under its jurisdiction in western Oregon to maintain healthy, diverse, and productive ecosystems so that present and future generations may continue to benefit from public lands.

There are several basic principles supporting this vision:

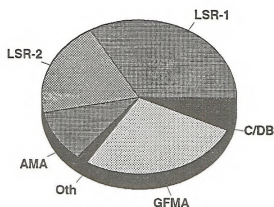
- natural resources can be managed to provide for human use and a healthy environment;
- resource management must be focused on ecological principles to reduce the need for single resource or single species management;
- stewardship, the involvement of people working with natural processes, is essential for successful implementation;
- the BLM cannot achieve this vision alone but can, by its management processes and through cooperation with others, be a significant contributor to its achievement; and
- a carefully designed program of monitoring, research, and adaptation will be the change mechanism for achieving this vision.

Strategy

Lands administered by the BLM will be managed to maintain healthy, functioning ecosystems while providing a sustainable production of natural resources. This management strategy, titled ecosystem management, involves the use of ecological, economic, social, and managerial principles to ensure the sustained condition of the whole. Ecosystem management emphasizes the complete ecosystem instead of individual components and looks at sustainable systems and products that people want and

need. It seeks a balance between maintenance and restoration of natural systems and sustainable yield of resources.

The building blocks for this strategy are comprised of several major land use allocations - Riparian Reserves, Late-Successional Reserves, Adaptive Management Areas, Matrix which includes General Forest Management Areas and Connectivity/Diversity Blocks. These land use allocations are located and configured in the landscape to support overall ecosystem function and to meet the vision for management of federal lands in western Oregon. Additional land use allocations include a variety of special purpose management areas such as recreation sites, wild and scenic rivers, and visual resource management areas. The major land use allocations are displayed in figure S-1 and maps 2-2a and 2-2b.



Land Allocations/Classifications		Acres ¹
Late-Successional Reserves		
LSR-1	Outside the Adaptive Management Area	132,100
LSR-2	Inside the Adaptive Management Area ²	79,700
AMA	Other Adaptive Management Area (NonLSR) ²	43,700
GFMA	General Forest Management Area	107,300
C/DB	Connectivity/Diversity Blocks	27,400
Oth	Other ³	7,900
Total		398,100

¹ There are 221,800 acres of Riparian Reserves underlying all of the allocations/classifications shown in this chart. Overlaps could not be eliminated due to limitations in the database. There are no overlaps in the other acres.

² Total Adaptive Management Area acreage is 123,400.

³ This category includes a District-Designated Reserve and Table Rock Wilderness.

Figure S-1 Major Land Allocations of the Proposed Resource Management Plan

Each land use allocation will be managed according to specific objectives and management actions/direction. During initial implementation of the plan, the stated objectives and management actions/direction will provide the rules and limits governing actions and the principles specifying the environmental conditions or levels to be achieved and maintained. As BLM gains experience in implementing the plan and applying the concepts of adaptive management, the stated objectives and management actions/direction will be refined for specific geographic areas.

There are two major management concepts underlying the plan - Ecological Principles for Management of Late-Successional Forests and the Aquatic Conservation Strategy.

Ecological Principles for Management of Late-Successional Forests

One goal of the proposed resource management plan is to maintain late-successional and old-growth species habitat and ecosystems on federal lands. A second goal is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations.

All land use allocations described in the proposed resource management plan will contribute to these two goals. For instance, Late-Successional Reserves and Riparian Reserves and special management areas (e.g., areas of critical environmental concern) will be managed to enhance and/or maintain late-successional forest conditions. The General Forest Management Area and Connectivity/Diversity Blocks will be managed to retain late-successional forest legacies (e.g., coarse woody debris, green trees, snags, and late-successional forest patches).

Aquatic Conservation Strategy

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy will protect salmon and steelhead habitat on federal lands managed by the Forest Service and BLM within the range of the Pacific Ocean anadromy.

The Aquatic Conservation Strategy is designed to meet the following objectives:

- Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
- Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, up slope areas, headwater tributaries, and intact refuge. These lineages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
- Maintain and restore the sediment regime under which an aquatic ecosystem evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
- Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (i.e., movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
- Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
- Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, watershed analysis, and watershed restoration.

Riparian Reserves

See Riparian Reserves in a section to follow.

Key Watersheds

A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat and areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program.

There are two types of Key Watersheds - Tier 1 and Tier 2. Tier 1 watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program.

Tier 1 Key Watersheds in the district are as follows:

Key Watershed Name	Approx. BLM Acres
Clackamas River Corridor	400
Collawash River	800
Drift Creek (Alsea)	1,100
Drift Creek (Siletz)	2,000
Elkhorn Creek (Trask)	2,200
Fish Creek	200
Kilchis River	3,300
Little North Santiam River	13,600
Lower North Fork Wilson River	1,400
North Fork Siletz River	4,400
Salmon River	1,400
Tobe Creek	1,800
Upper Lobster Creek	13,500
Upper Nestucca River	35,800
Yachats	70
Total	81,970

Tier 2 watersheds do not contain at-risk fish stocks, but they are important sources of high quality water. The Tier 2 watersheds in the district are Bull Run River and Eagle Creek.

Key Watersheds overlay other land use allocations in the district and place additional management requirements or emphasis on activities in those areas.

Watershed Analysis

Watershed analysis is one of the principle means that will be used to meet the ecosystem management objectives of this resource management plan. Watershed analyses will be the mechanism to support ecosystem management at approximately the 20 to 200 square mile watershed level.

Watershed analysis will focus on collecting and compiling essential resource management information within a watershed. It will be an analytical process, not a decision-making process with a proposed action requiring National Environmental Policy Act documentation. It will serve as a basis for developing project-specific proposals, and determining monitoring and restoration needs for a watershed. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving Aquatic Conservation Strategy objectives, then subsequent decisions will need to address that information.

Watershed Restoration

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity. Other restoration opportunities include meadow and wetland restoration and mine reclamation.

Riparian Reserves

Riparian Reserves support Aquatic Conservation Strategy objectives and provide habitat for special status species and record of decision special attention species.

There are approximately 221,800 acres of riparian reserves in the district. Calculation of these acres is based on prescribed widths and estimated miles of stream in the various categories described in the record of decision. The widths are intended to provide a high level of fish, wildlife and plant habitat and riparian protection until watershed and site analysis can be completed. Although Riparian Reserve boundaries on permanently flowing streams may be adjusted, they are considered to be the approximate widths necessary for attaining Aquatic Conservation Strategy objectives.

Riparian Reserves consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance initially calculated as follows, whichever is greatest:

- Fish-bearing streams: equal to the height of two site-potential trees, or 300-foot slope distance (600 feet total, including both sides of the stream channel).
- Permanently flowing non-fish-bearing streams: equal to the height of one site-potential tree, or 150-foot slope distance.
- Seasonally flowing or intermittent streams, wetlands less than one acre, and unstable and potentially unstable areas: equal to the height of one site-potential tree, or 100-foot slope distance.

In the last case and in the following ones, Riparian Reserves include the extent of unstable and potentially unstable areas, and the extent of the wetland or

water body. In the following ones they also include the extent of seasonally saturated soil, and distances initially calculated as follows, whichever is greatest:

- Constructed ponds and reservoirs, and wetlands greater than one acre: equal to the height of one site-potential tree, or to 150-foot slope distance from the edge of a wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs.
- Lakes and natural ponds: equal to the height of two site-potential trees, or 300-foot slope distance.

As a general rule, management actions/direction for Riparian Reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives. Watershed analysis and appropriate National Environmental Policy Act compliance will be required to change Riparian Reserves in all watersheds.

Timber harvest, including fuelwood cutting, will be precluded in Riparian Reserves, with exception of salvage if required to attain Aquatic Conservation Strategy objectives after catastrophic events, or when watershed analysis determines that present and future woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected.

Silvicultural practices will be applied in Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

New roads in Riparian Reserves will be designed to meet Aquatic Conservation Strategy objectives.

Late-Successional Reserves

Late-Successional Reserves will be established to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth forest-related species including the northern spotted owl and marbled murrelet; and to maintain a functional, interacting, late-successional and old-growth forest ecosystem.

There are 211,800 acres of Late-Successional Reserves in the district. The five components of this reserve system are:

1. Mapped Late-Successional Reserves: These reserves incorporate Key Watersheds to the extent practicable; some or parts of the Late-Successional/Old Growth 1 and 2 areas mapped by the Scientific Panel on Late-Successional Forest Ecosystems; and some or parts of the Designated Conservation Areas from the *Final Draft Spotted Owl Recovery Plan*.
2. Late-successional/old growth 1 and 2 areas within marbled murrelet zone 1, as mapped by the Scientific Panel on Late-Successional Forest Ecosystems, and certain owl additions in the Northern Coast Range Adaptive Management Area as mapped by the panel.
3. Occupied marbled murrelet sites.
4. Known spotted owl activity centers (as of January 1, 1994).
5. Protection buffers for special status species and record of decision special attention species.

A District-Designated Reserve totaling 1,800 acres, will be managed the same as Late-Successional Reserve. See maps 2-2a and 2-2b for locations of Late-Successional Reserves and the District-Designated Reserve. Occupied marbled murrelet sites, known spotted owl activity centers, and protection buffers are unmapped.

Silvicultural treatments that are beneficial to the creation of late-successional habitat will be conducted inside Late-Successional Reserves.

If needed to create and maintain late-successional forest conditions, thinning operations in most Late-Successional Reserves will be conducted in forest stands up to 80 years of age. In the Northern Coast Range Adaptive Management Area, thinning operations to create desired conditions will be conducted in stands up to the 110 year age class (106 to 115 years old). This will be accomplished by precommercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown).

Salvage of dead trees in Late-Successional Reserves will be limited to areas where stand-replacing events exceed ten acres in size and canopy closure has been reduced to less than 40 percent. All standing live trees, including those injured (e.g., scorched) but likely to survive, will be retained, as well as snags that are likely to persist until late-successional forest conditions have developed and a new stand is again producing large snags.

Adaptive Management Areas

Adaptive Management Areas were created as places to develop and test new management approaches to integrate and achieve ecological and economic health and other social objectives. They also are intended to contribute substantially to the achievement of record of decision objectives, including provision of well-distributed late-successional habitat outside reserves; retention of key structural elements of late-successional forests on lands subjected to regeneration harvest; restoration and protection of riparian zones; and provision of a stable timber supply.

There are 123,400 acres of BLM-administered land in the Northern Coast Range Adaptive Management Area.

A plan will be developed for the Adaptive Management Area; however, management activities in the area will proceed while the plan is being developed.

Matrix (Connectivity/Diversity Blocks and General Forest Management Area)

Management activities in the 134,700 acres in the Matrix are expected to:

- produce a sustainable supply of timber and other forest commodities;
- provide connectivity (along with other allocations such as Riparian Reserves) between Late-Successional Reserves;
- provide habitat for a variety of organisms associated with both late-successional and younger forests;
- provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees; and
- provide early successional habitat.

In the Matrix, there are approximately 107,300 acres of BLM-administered land in the General Forest Management Area and 27,400 acres in Connectivity/Diversity Blocks. Connectivity/Diversity Blocks vary in size and are distributed throughout the Matrix.

Timber harvest and other silvicultural activities will be conducted in that portion of the Matrix with suitable forest lands.

Timber harvest will be conducted so as to provide a renewable supply of large down logs well distributed across the Matrix landscape in a manner that meets the needs of species and provides for ecological functions. Down logs will reflect the species mix of the original stand.

Green trees and snags will be retained throughout the General Forest Management Area, including six to eight green conifer trees per acre in regeneration harvest units. Snags will be retained within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels. In addition, green trees will be retained for snag recruitment in timber harvest units where there is an identified, near-term (less than three decades) snag deficit. These trees do not count toward green-tree retention requirements.

Connectivity/Diversity Blocks will be spaced throughout the Matrix. They will be managed to maintain 25 to 30 percent of each block in late-successional forest at any point in time. Riparian Reserves and other allocations with late-successional forest count toward this percentage.

In fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest, all remaining late-successional forest stands will be retained.

Additional management direction for the Matrix is summarized in the Timber resources section later in this summary.

Air Quality

Efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan will continue. Activities will be conducted so as to maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the Oregon state implementation plan.

Smoke emissions will be controlled to meet state targets for reduction from historical levels. This will be accomplished by planning, conducting, monitoring, and, if necessary, adjusting prescribed fire activities in accordance with the state implementation plan and the Oregon Smoke Management Plan.

The potential for wildfire emissions will be reduced through the use of prescribed fire and other fuels management techniques.

Water and Soils

The Aquatic Conservation Strategy and Riparian Reserve management previously discussed are the main elements of water and soils management.

In addition, management will comply with state water quality requirements to restore and maintain water quality to protect recognized beneficial uses, and will strive to improve and/or maintain soil productivity.

Soil and water conditions will be improved and/or maintained by closing selected areas to off-highway vehicle use and/or limiting such use to existing or designated roads and trails. See the Recreation section later in this summary, for additional details.

BLM will continue to implement a nonpoint source management program in cooperation with the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality. Coordination will also continue with the Oregon Department of Environmental Quality to accomplish best management practices which protect beneficial uses of water.

Consistency of management activities with the *Oregon Water Management Program* for forest practices and with Oregon's water quality criteria and guidelines (Oregon Administrative Rule 340-41) will be ensured.

Flood plains and wetlands will be protected in accordance with Executive Orders 11988 and 11990 and BLM's *Riparian-Wetlands Initiative for the 1990s*.

Wildlife Habitat

Late-Successional Reserve, Riparian Reserve and Matrix management all contribute to management of wildlife habitat. Management will be directed to enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations. Management for special status species and record of decision special attention species habitat (discussed later) also addresses many wildlife species.

Fish Habitat

The Aquatic Conservation Strategy is the basis for fish habitat management. Riparian Reserve management is a key element of management intended to

maintain or enhance the fisheries potential of streams and other waters consistent with BLM's *Fish and Wildlife 2000* plan, the *Bring Back the Natives* initiative, and other nationwide initiatives. This management is also intended to promote the rehabilitation and protection of fish stocks at risk and their habitat.

Priority for fish habitat enhancement projects will be given to watersheds supporting at-risk fish species and stocks and those requiring extensive restoration. Actions will be taken to rehabilitate streams and other waters to enhance natural populations of anadromous and resident fish. Possible rehabilitation measures will include, but not be limited to, fish passage improvements, instream structures using boulders and log placement to create spawning and rearing habitat, placement of fine and coarse materials for over-wintering habitat, and riparian rehabilitation to establish or release existing coniferous trees.

The combination of these measures will improve fish habitat on BLM-administered lands, but improvement will occur slowly and continue for more than a century.

Special Status and Record of Decision Special Attention Species and Habitat

Management will be designed to protect, manage and conserve federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and BLM special status species policies. Management for the conservation of federal candidate and bureau sensitive species and their habitats will focus on not contributing to the need to list and to recover the species. Management for the conservation of state-listed species and their habitats will be designed to assist the state in achieving management objectives.

Assessment species (which are of lesser concern) will be managed where possible so as to not elevate their status to any higher level of concern. Record of decision special attention species will also be managed so as not to elevate their status to any higher level of concern.

Community structure, species composition, and ecological processes of special status plant and animal habitat will be maintained or restored.

BLM will consult/conference with or request technical assistance from the U.S. Fish and Wildlife Service or National Marine Fisheries Service for any proposed action which may effect federally listed or proposed species or their habitat. Based on the results of consultation/conferencing or technical assistance, the proposed action will be modified, relocated, or abandoned.

Table S-3 shows the numbers of special status plant and animal species that have been identified as inhabiting BLM-administered lands in the planning area:

Table S-3 Special Status Species Found on BLM-Administered Lands

	Number of Plant and Fungi Species	Number of Animal Species
Federal Endangered	0	4
Federal Threatened	1	7
Federal Proposed	0	0
Federal Candidate	6	36
State-Listed	1	8
Bureau Sensitive	1	2
Bureau Assessment	4	29

¹ Also includes species that may potentially occur.

The survey and manage provision of the record of decision will be implemented within the ranges of its special attention species and the particular habitats that they are known to occupy.

Protection buffers will be provided for specific rare and locally endemic species and record of decision special attention species in the upland forest matrix.

Establishment of Late-Successional Reserves and other general allocations provide the framework for protection of the northern spotted owl. In addition 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center in the Matrix will be retained for all known (as of January 1, 1994) spotted owl activity centers. These allocations and record of decision standards and guidelines are expected to achieve recovery of the northern spotted owl.

As noted previously, Late-Successional Reserves include late-successional/old growth 1 and 2 areas in marbled murrelet zone 1 and all occupied murrelet sites. In addition, contiguous existing and recruitment habitat for marbled murrelets (i.e., stands that are capable of becoming marbled murrelet habitat within 25 years), within a one-half mile radius of any site where the birds' behavior indicates occupation, will be protected. These allocations and record of decision standards and guidelines provide a high likelihood of a marbled murrelet population well distributed on federal lands in the region.

Eight known and potential bald eagle nest sites and communal roosting areas on BLM-administered lands will be protected.

All known populations of Nelson's checkermallow on BLM-administered lands will be protected.

Special Areas

All but one special area will be retained. The Big Canyon Area of Critical Environmental Concern designation will be dropped, but values will be protected by allocation as a Late-Successional Reserve. An additional nine areas will be designated as special areas. This will include two new research natural areas, increasing the number to eight on BLM-administered lands in the planning area.

Cultural Resources Including American Indian Values

Cultural resource localities will continue to be identified and managed for public, scientific, and cultural heritage purposes.

Responsibilities to American Indian groups regarding heritage and religious concerns will be fulfilled.

Visual Resources

Some 14,100 acres in areas protected by congressional designation and in other areas with high-value, highly sensitive visual resources will be managed specifically for preservation of scenic quality. Some 22,800 acres in areas with high-value, moderately sensitive visual resources will be managed to retain scenic quality. Landscape alterations caused by management will not attract attention. An additional 59,600 acres will be managed to partially retain scenic quality. Landscape alterations will not dominate the view. Due to protection of lands in reserves and special management areas, scenic quality will be retained on most BLM-administered lands.

Wild and Scenic Rivers

Segments of the Nestucca and Molalla rivers, totaling 27.7 miles, will be recommended to Congress for designation as components of the National Wild and Scenic Rivers System. Approximately 23.5 miles of river determined eligible for designation and studied by BLM are found not suitable for such designation.

Rural Interface Areas

Rural interface areas include 36,380 acres of BLM-administered land adjacent or near private lands zoned for 1- to 20-acre lots. These acres plus any other areas with rural residences will be considered for special resource management practices to protect personal health and property.

Socioeconomic Conditions

Management will contribute to local, state, national, and international economies through sustainable use of BLM-managed lands and resources and use of innovative contracting and other implementation strategies. It will also provide amenities (e.g., recreation facilities, protected special areas, and high quality fisheries) that enhance communities as places to live and work.

BLM resource production is expected to support about 510 jobs and provide 9.1 million dollars a year in personal income during the life of the plan. Those jobs are about 1,820 less than the average supported from 1984 to 1988.

The net decrease in jobs cited above combines with an expected decline in jobs supported by Forest Service, private, and other timber supplies. This could lead to substantial job decline in some communities in the planning area with consequent adverse effects on community stability.

Jobs are also supported by recreation and downstream and offshore recreational and commercial fishing for fish supported by BLM habitat. However, fishing opportunities related to BLM management are not expected to change in the next ten years. Fish habitat improvement expected under the proposed resource management plan will take place very slowly and continue for more than 100 years.

Recreation

Management will provide a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area. This will be done in a manner consistent

with BLM's *Recreation 2000 Implementation Plan* and *Oregon-Washington Public Lands Recreation Initiative*. Scenic, natural and cultural resources will be managed to enhance visitor recreation experiences and produce satisfied public land users. Locally-sponsored tourism initiatives and community economic strategies will be supported by providing recreation projects and programs that benefit both short- and long-term implementation.

Twelve existing recreation sites and eight existing recreation trails will remain open. Ten additional recreation sites and eleven recreation trails will be developed if funding is available. The emphasis of facility management and development will be to accommodate the increasing demand for recreation opportunities close to population centers and accessible by road.

Two road segments, totaling 22 miles, will continue to be managed as back country byways. One road segment, totaling 15 miles, will be designated as a new component of the National Back Country Byway System.

Management of off-highway vehicle uses will include the following designations: 129,900 acres open, 229,200 acres limited, and 39,000 acres closed either seasonally or year round. Use for administrative purposes and authorized removal of commercial commodities such as timber will be excepted.

All recreation activities on BLM-administered lands are expected to increase during the life of the resource management plan. Expected demand would be met for all activities.

Timber Resources

Management will provide a sustainable supply of timber and other forest products.

Lands available for scheduled timber harvest are as follows:

Land Use Allocation	Approx. BLM Acres
Matrix	
General Forest Management Areas (including visual resource management class II, rural interface, and Timber Production Capability Classification restricted)	40,600
Connectivity/Diversity Blocks	10,700
Adaptive Management Areas	10,200

The annual probable sale quantity from these allocations and the management planned for the Matrix is 5.7 million cubic feet (34.8 million board feet). Miscellaneous volume from Late-Successional Reserves is estimated to be 0.7 million cubic feet (4.0 million board feet).

Alternative 9 of the SEIS estimated the probable sale quantity for the Salem District to be 43.6 million board feet (short log). The district calculation of the probable sale quantity is 34.8 million board feet. The 20 percent difference is attributable to a change in the acreage base. Additional acres in first and second order intermittent streams are excluded from timber harvest in the probable sale quantity calculation by the district.

The probable sale quantity for the proposed resource management plan is an estimate of annual average timber sale volume likely to be achieved from lands allocated to planned, sustainable harvest. The use of probable sale quantity, rather than allowable sale quantity, recognizes uncertainties in the estimate. Harvest of this approximate volume of timber is considered sustainable over the long term based on the assumptions that the available land base remains fixed, and that funding is sufficient to make planned investments in timely reforestation, plantation maintenance, thinning, genetic selection, forest fertilization, timber sale planning, related forest resource protection, and monitoring.

The probable sale quantity represents neither a minimum level that must be met nor a maximum level that cannot be exceeded. It is an approximation because of the difficulty associated with predicting actual timber sale levels over the next decade, given the complex nature of many of the management actions/direction. It represents BLM's best assessment of the average amount of timber likely to be awarded annually in the planning area over the life of the plan, following a start-up period. The actual sustainable timber sale level attributable to the land-use allocations and management actions/direction of the proposed resource management plan may deviate by as much as 20 percent from the identified probable sale quantity. The potential variables are discussed in chapter 4, Timber Resources. As inventory, watershed analysis, and site-specific planning proceed in conformance with that management direction, the knowledge gained will permit refinement of the allowable sale quantity. (An allowable sale quantity will be declared when a decision on the proposed resource management plan is made.)

Logging systems will be selected based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives.

Regeneration harvests will be scheduled to assure that, over time, harvest will occur in stands at or above the age of volume growth culmination (i.e., culmination of mean annual increment). This refers to the age range which produces maximum average annual growth over the lifetime of a timber stand. In the planning area, culmination occurs between 70 and 110 years of age. During the first decade, regeneration harvests may be scheduled in stands as young as 60 years of age, in order to develop a desired age class distribution across the General Forest Management Area.

Silvicultural treatments and harvest designs will be based on the functional characteristics of the ecosystem and on the characteristics of each forest stand and site. Treatments will be designed, as much as possible, to prevent the development of undesirable species composition, species dominance, or other stand characteristics. The principles of integrated pest management and integrated vegetation management will be employed to avoid the need for direct treatments. Herbicides will be used only as a last resort to achieve management objectives.

Harvest of marketable hardwood stands will be planned in the same manner as conifer stands, if the land is not otherwise constrained from timber management. Volume from projected hardwood harvest is included in the probable sale quantity estimate. Where hardwood trees become established following harvest of conifers, reestablishing a conifer stand on the site will be planned.

Unscheduled harvests will occur from thinning and salvage in Late-Successional Reserves and may occur from salvage in Riparian Reserves.

Special Forest Products

BLM will manage for the production and sale of special forest products when demand is present and where actions taken are consistent with primary objectives for the land use allocation. The principles of ecosystem management will be used to guide the management and harvest of special forest products.

Energy and Minerals

Opportunities will be maintained for exploration and development of leasable and locatable energy and mineral resources.

Most BLM-administered lands will remain available for leasing of oil and gas or geothermal resources and location of mining claims, but a variety of designations and allocations such as areas of critical environmental concern, Late-Successional Reserves, and Riparian Reserves will place restrictions on exploration and development activities.

Land Tenure Adjustments

Land tenure adjustments would benefit a variety of uses and values, emphasizing opportunities that conserve biological diversity or enhance timber management opportunities. As a matter of practice, Oregon and California revested railroad lands allocated to timber management will only be exchanged for lands to be managed for multiple-use purposes.

Lands are categorized in three land tenure adjustment zones:

- **Zone 1** 160,200 acres to be retained under BLM administration.
- **Zone 2** 228,000 acres of land to be blocked up or exchange for other lands with significant resource values in zones 1 and 2.
- **Zone 3** 9,900 acres where only lands with unique resource values will be retained; other lands in this zone will be exchanged, sold, or transferred to another agency using appropriate disposal mechanisms.

Roads

Roads will be managed to meet the needs identified by various resource programs (e.g., recreation access and timber hauling). Problems associated with roads will be corrected by reducing the number of minor collector roads, the density of roads in some areas, and erosion.

Monitoring the Resource Management Plan

Monitoring and evaluation of the resource management plan will be carried out at appropriate intervals for the following purposes:

- to be sure activities are occurring in conformance with the resource management plan;

- to determine if activities are producing the expected results; and
- to determine if activities are causing the effects identified in the environmental impact statement.

Consistency with State, Local, Tribal and Other Federal Plans

Federal planning regulations require that BLM resource management plans be consistent with other officially approved or adopted resource-related plans, and the policies and procedures therein, so long as the other plans are consistent with applicable federal laws and regulations. The BLM has consulted with other agencies and tribes and/or compared the proposed resource management plan with plans of other federal agencies, state and local governments, and Indian tribes. The proposed resource management plan appears to be consistent with all such plans, policies and procedures, except perhaps the following:

- Possible cumulative effects of BLM and other landowners' activities in some watersheds could lead to violation of the state of Oregon's antidegradation policy.
- Possible inconsistency with Oregon's Statutory Wildlife Policy, by maintaining some wildlife populations at less than optimum.
- Possible inconsistency with the clear cut size and proximity requirement of section 4 of the Oregon Forest Practices Act.
- Possible delay in reforestation beyond the one year required by the Oregon Forest Practices Act, due to the requirement for smoke management clearance before burning slash.
- Probable inconsistency with the Oregon Benchmarks for increasing standard of living, affordable housing, family stability, and stable home life.
- Partial inconsistency with Oregon statewide planning goal 9 (Economy of the State), due to reduced levels of BLM-resource-dependent employment and payments to counties.

Public Involvement

Public involvement has been an integral part of BLM's resource management planning effort. Activities have included mailers or brochures, public meetings, open houses, field trips, distribution of planning documents

Summary

and related comment periods, informal contacts, group meetings, written letters, and responses to comments.

Mailers requested comments on issue identification, development of planning criteria contained in state director guidance for the process, and BLM's analysis of the management situation which set the baseline for development of the draft resource management plan. Suggestions for formulation of the preferred alternative were also requested.

The draft resource management plan was released for public review and comment in 1992. Comments were evaluated and some substantive recommendations led to changes in the proposed resource management plan or the analysis of environmental consequences.

Any protests to the director of BLM will be reviewed and addressed before a record of decision on the proposed resource management plan is completed. Comments directly to the district manager will also be considered in formulating the decision.



Table S-1 Comparison of Allocations and Management Actions by Alternative

	PRMP ¹	DRMP PA ²	No Action ³
Water Quality and Riparian Zones³			
Riparian Management Area			
Protection (average width in feet on each side of stream)			
Stream Order: First	-- ⁵	-- ⁶	
Second	-- ⁵	-- ⁶	
Third	-- ⁵	105 ⁶	
Fourth	-- ⁵	150	
Fifth	-- ⁵	210	
Sixth+	-- ⁵	240	
Lakes, ponds, and other waters	-- ⁵	150	
Riparian Reserves/Riparian Management Area (acres)	221,800	40,600	23,400

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.⁴ First and second order perennial streams would have average 75-foot Riparian Management Area.⁵ Permanent and intermittent streams and other waters would be allocated as Riparian Reserves with varying widths (see chapter 2, Riparian Reserves).⁶ First, second, and third order fish-bearing streams would average 150-foot Riparian Management Area.⁷ Riparian Management Area for intermittent streams.

A ⁴	B ⁴	C ⁴	D ⁴	E ⁴
				50 ⁷
			60 ⁷	60 ⁷
75	75	105	140	200
75	100	150	200	200
75	140	210	280	280
75	160	240	320	320
75	100	150	200	400
24,300	28,800	36,000	45,400	57,700

Table S-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Old-Growth and Mature Forest Habitat³			
Management Decision	Manage 55 percent of the land as Late-Successional Reserves. Manage 7 percent as Connectivity/Diversity Blocks.	Manage 47 percent of the land as old-growth emphasis areas. Manage 11 percent of the land as connectivity areas.	Manage older forest retention areas as allocated in 1983 plans (no harvest).
Area managed for retention and development of older forest (acres)	219,700	221,500	79,000
Area managed for maintenance of older forest characteristics (acres)	27,400	33,300	0
Older forest retained end of first decade (acres)	107,600	98,600	77,700

¹ Proposed resource management plan.

² Preferred alternative in draft resource management plan.

³ See narrative for management direction by alternative.

A	B	C	D	E
	Contribute to habitat diversity and old growth in a corridor system with blocks of 640 acres connected by 80-acre stepping-stone blocks.	Manage for retention and improvement of biological diversity maintaining 18 percent of the land in restoration and retention blocks.	Manage as recommended by the 1990 Conservation Strategy for the northern spotted owl.	Contribute to habitat diversity by protecting existing stands over 150 years old, suitable spotted owl habitat within two miles of each spotted owl site and additional habitat to benefit amphibians and pileated woodpeckers.
59,900	103,900	132,400	209,100	196,700
0	0	238,600	0	0
68,900	75,600	96,800	105,200	92,000

Table S-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Timber³			
Forest Management Allocations (acres of commercial forest land):			
Intensive or General Forest Management Area	50,800	109,600	278,000
Restricted	10,700	39,700	9,900
Enhancement of other uses or not available	273,500	180,000	41,400
Practices (assumed average annual acres for first decade):			
Regeneration harvest	600	2,400	3,100
Commercial thinning/density management harvest	910	980	500
Site preparation			
Prescribed fire	480	1,640	2,320
Other	590	240	470
Stand maintenance/protection	3,130	1,840	2,640
Release/precommercial thinning	2,970	2,120	2,790
Brushfield/hardwood conversion	90	250	100
Planting/regular stock	480	660	1,370
Planting/genetically selected stock	450	1,870	2,050
Fertilization	600	1,460	3,810
New road construction (miles / acres) first ten years	5 / 26	16 / 90	11 / 60
Probable sale quantity (million cubic feet)	5.7	21.5	37.2
Probable sale quantity (million board feet)	34.8	136.5	239.2
Miscellaneous volume (million cubic feet)	0.7	N / A	N / A
Miscellaneous volume (million board feet)	4.0	N / A	N / A

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.

N / A = Not applicable.

A	B	C	D	E
311,000	264,900	0	0	132,700
0	2,100	238,600	161,800	41,400
18,300	62,300	90,700	167,500	155,200
4,560	4,000	1,800	1,800	2,100
420	410	2,600	280	330
3,010	3,010	410	1,320	1,570
930	600	720	270	310
3,870	3,400	970	1,500	1,770
4,100	3,610	1,190	1,590	1,880
430	390	190	160	220
2,920	2,330	920	110	510
2,100	2,100	920	1,820	1,780
4,150	3,870	3,140	0	2,160
16 / 90	12 / 600	18 / 100	9 / 50	8 / 50
51.9	43.9	17.1	17.3	20.1
333.8	280.5	107.0	106.7	127.1
N / A	N / A	N / A	N / A	N / A
N / A	N / A	N / A	N / A	N / A

Table S-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Special Status Species Including Threatened and Endangered Species Habitat³			
Management Direction	Manage habitats of federal candidate, state-listed and bureau sensitive species on all BLM-administered lands. ⁴	Same as PRMP.	
Acres managed so as not to contribute to need to list	398,100	393,600	79,000
Wildlife (Including Fisheries) Habitat³			
Special habitat buffers (feet)	Equivalent to alternative C	100-200	0
Fish habitat improvement (miles)	54	54	20
Forage seeding (acres/year)	200-500	200-500	400-700
Special Areas³			
Existing ACEC/RNA retained (number / acres)	6 / 2,797	6 / 2,797	6 / 2,797
New ACEC/RNA designated (number / acres)	2 / 690	2 / 690	0 / 0
Total ACEC/RNA (number / acres)	8 / 3,487	8 / 3,487	6 / 2,797
Other existing ACEC retained (number / acres)	13 / 4,428	13 / 8,666	14 / 9,061
Other new ACEC designated (number / acres)	6 / 680	5 / 709	0 / 0
Total other ACEC (number / acres)	19 / 5,108	18 / 9,375	14 / 9,061
Other existing Special Areas retained (number / acres)	2 / 259	2 / 259	2 / 259
Other new Special Areas allocated (number / acres)	1 / 5	2 / 585	0 / 0
Total other Special Areas (number / acres)	3 / 264	4 / 844	2 / 259

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.⁴ Under the proposed resource management plan, SEIS special attention species will also be protected.

A	B	C	D	E
Protect habitats of federal candidate, state-listed, and bureau sensitive species where such mitigation would not diminish commercial use.	Same as A plus protect those habitats on public domain lands.	Same as B plus additional protection provided by management for older forests.	Protect habitats of federal candidate, state-listed, and bureau sensitive species on all BLM-administered lands.	Same as D.
59,900	145,600	158,700	398,100	398,100
0	0	100-200	100-300	100-300
54	54	54	54	54
0	400-800	200-400	200-300	200-400
0 / 0	6 / 2,797	6 / 2,797	6 / 2,797	6 / 2,797
0 / 0	1 / 556	2 / 690	2 / 690	2 / 690
0 / 0	7 / 3,353	8 / 3,487	8 / 3,487	8 / 3,487
1 / 106	14 / 4,823	14 / 4,823	14 / 9,061	14 / 9,061
1 / 10	2 / 415	7 / 831	7 / 831	7 / 831
2 / 116	16 / 5,238	21 / 5,654	21 / 9,959	21 / 9,959
1 / 76	2 / 259	2 / 259	2 / 259	2 / 259
0 / 0	1 / 5	1 / 5	1 / 5	2 / 585
1 / 76	3 / 264	3 / 264	3 / 264	3 / 264

Table S-1 Comparison of Allocations and Management Actions by Alternative

	PRMP ¹	DRMP PA ²	No Action
Recreation Resources³			
Recreation sites			
Existing (number / acres)	12 / 800	12 / 766	12 / 766
Potential (number / acres)	10	14	1
Trails			
Existing (number / miles)	8 / 47	7 / 26	7 / 26
Potential (number)	11	6	6
Special Recreation Management Areas			
Existing (number / acres)	4 / 1,800	1 / 5,300	1 / 5,300
New (number / acres)	7 / 70,800	6 / 16,382	0 / 0
Area open to off-highway vehicle use (acres)	129,900	287,700	333,700
Area limited to off-highway vehicle use (acres)	229,200	75,100	50,500
Area closed to off-highway vehicle use (acres)	39,000	30,800	9,400
Wild and Scenic Rivers³			
River segments found suitable for designation as:			
Recreational (number / miles)	2 / 27.7	2 / 27.7	0 / 0
Scenic (number / miles)	0 / 0	0 / 0	0 / 0
Wild (number / miles)	0 / 0	0 / 0	0 / 0

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.

A	B	C	D	E
2 / 633 0	12 / 766 6	12 / 766 12	12 / 766 12	12 / 766 14
2 / 18 0	2 / 18 0	3 / 19 1	7 / 26 2	7 / 26 6
0 / 0 0 / 0	1 / 1,062 1 / 406	1 / 1,062 2 / 725	1 / 5,300 3 / 3,042	1 / 5,300 6 / 18,751
331,100	319,200	310,600	292,600	262,100
41,800	48,600	56,000	71,000	99,200
20,700	25,800	27,000	30,000	32,300
0 / 0 0 / 0 0 / 0	3 / 28.5 0 / 0 0 / 0	3 / 28.5 1 / 3.0 0 / 0	4 / 34.8 2 / 12.9 1 / 3.0	5 / 51.2 2 / 12.9 1 / 3.0

Table S-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Visual Resources³			
Management Decision	Manage congressionally designated and other high value, highly sensitive areas as VRM class I. Manage high value, moderately sensitive areas as VRM class II. Manage other areas as VRM classes III and IV.	Same as PRMP.	Manage visual resources in accordance with 1983 plans.
Area managed as VRM class I (acres)	14,100	14,700	0 ⁴
Area managed as VRM class II (acres)	22,800	24,600	15,900
Area managed as VRM class III (acres)	59,600	58,100	62,500
Area managed as VRM class IV (acres)	301,600	296,200	298,000
Land Tenure³			
Management Decision	Make exchanges of O&C lands to contribute to biological diversity or to enhance timber management. Substantial acres of O&C forest land available for timber management would not be exchanged for lands to be managed for a single purpose. Sell public domain lands and O&C lands other than available commercial forest land, meeting criteria of Federal Land Policy and Management Act section 203(a). Make leases to accommodate other appropriate uses.	Same as PRMP.	Pursue sales, exchanges and transfers as defined in 1983 plans.

A	B	C	D	E
Manage available forest lands as VRM class IV and all other lands as inventoried.	Manage available forest lands as inventoried within 1/4-mile of recreation sites, state and federal highways and designated rivers. Manage other available forestland as VRM class IV. Manage all other lands as inventoried.	Same as A except on available forest lands where BLM-administered land is more than half of a watershed, manage as inventoried.	Manage all lands as inventoried.	Same as D except manage as VRM class III all lands inventoried as class IV, and manage as class I all lands within 1/4-mile of recreation sites, state and federal highways and designated rivers.
10,400	17,000	17,200	17,200	21,400
12,600	21,800	34,300	67,900	80,600
10,800	19,700	49,100	52,200	291,600
359,800	335,100	293,000	256,300	0

Make exchanges to enhance non-declining timber harvest level on BLM-administered lands. Sell or lease no commercial timberland.	Make exchanges of O&C lands emphasizing opportunities primarily to enhance timber management opportunities. Sell public domain lands and O&C lands other than available commercial forestlands, meeting criteria of Federal Land Policy and Management Act section 203(a). Make leases to accommodate other appropriate uses.	Same as B except also make exchanges to contribute to conservation of biological diversity.	Emphasize exchanges to acquire lands with nontimber values. Sell lands other than available commercial forestlands, meeting criteria (1) or (2) of Federal Land Policy and Management Act section 203(a). Lease only under the Recreation and Public Purpose Act.	Same as D.
---	---	---	---	------------

¹ Proposed resource management plan.

² Preferred alternative in draft resource management plan.

³ See narrative for management direction by alternative.

⁴ Although not allocated as VRM class I acres, areas such as Table Rock Wilderness are managed to the same standards as VRM class I areas.

VRM = Visual resource management

Table S-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Rights-of-Way³			
Rights-of-way exclusion areas (acres)	24,300	24,300	28,900
Rights-of-way avoidance areas (acres)	239,800	45,200	8,900
Energy and Mineral Resources³			
Area open to leasable energy/mineral development (acres)	391,900	387,400	387,400
Area closed to leasable energy/mineral development (acres)	6,200	6,200	6,200
Area open to locatable energy/mineral development (acres)	376,000	384,500	386,100
Area closed to locatable energy/mineral development (acres)	22,100	9,100	7,500
Area open to salable energy/mineral development (acres)	171,600	331,600	379,200
Area closed to salable energy/mineral development (acres)	226,500	62,000	14,400
Rural Interface Area Management³			
Area considered for alternative management practices (acres)	36,380+ ⁴	36,380+ ⁴	0
Area where clearcutting, herbicide spraying and prescribed burning is excluded (acres)	0	0	0
Area managed for VRM class II objectives (acres)	0	0	0
Area managed for VRM class III objectives (acres)	0	0	0
¹ Proposed resource management plan. ² Preferred alternative in draft resource management plan. ³ See narrative for management direction by alternative. ⁴ BLM-administered lands adjacent to areas zoned for lots larger than 40 acres would also be considered for alternative management practices. VRM = Visual resource management.			

A	B	C	D	E
16,200	39,100	53,100	106,300	112,100
16,500	26,500	26,800	26,800	31,000
387,400	387,400	387,400	387,400	387,400
6,200	6,200	6,200	6,200	6,200
386,300	384,900	384,700	383,300	382,900
7,300	8,700	8,900	10,300	10,700
377,600	372,300	370,600	358,200	358,400
16,000	21,300	23,000	35,400	35,200
0	3,400	17,500	0	0
0	0	0	17,500	36,400
0	0	0	16,900	31,800
0	2,300	14,900	0	0

Table S-2 Summary of Environmental Consequences, Comparison of Alternatives

Effects	Alternatives							
	PRMP	DRMP PA ¹	NA	A	B	C	D	E
Air Quality (1,000 tons of slash burned ² annually in prescribed fires, 10 years; baseline - 101.8)	28.7	38.1	68.6	93.9	91.4	45.6	40.2	47.6
Biological Diversity								
After 10 years								
Mature forest (acres)	76,100	70,600	60,500	57,100	57,100	74,800	76,100	59,300
Old-growth forest (acres)	31,200	28,000	17,200	11,800	18,500	22,000	29,100	32,700
After 100 years								
Mature forest (acres)	239,200	148,400	48,700	33,800	57,500	191,000	135,000	122,100
Old-growth forest (acres)	90,400	54,200	33,500	23,700	44,100	51,500	74,400	77,400
Riparian Trend (end of 200 years)	+	+	-	-	+	+	+	+
Dominant Woodpecker Populations (percent of potential, 100 years)	greater than 60	60	40	40	40	60	60	60
Elk Habitat (10 years) ³								
Habitat areas improving (number)	10	2	0	1	1	2	2	0
Habitat areas unchanged (number)	10	18	0	6	8	8	18	14
Habitat areas declining (number)	7	7	27	20	18	17	7	13
Threatened and Endangered Animal Species								
Spotted owl suitable habitat after 100 years (1,000 acres)	327	190	NE	51	98	152	199	172
Bald eagle breeding sites protected (number)	5	5	5	5	5	5	5	5
Potential bald eagle breeding sites protected	3	3	3	3	3	3	3	3
Marbled murrelet suitable habitat after 100 years (1,000 acres)	212	NE	NE	29	54	131	143	104

¹ Preferred alternative in draft resource management plan.² Tons of slash burned correlates directly with the level of emissions.³ The planning area was divided into 102 elk habitat areas; 27 of those, where BLM administers substantial acreage, were analyzed.

NA = No action alternative

NE = No estimate

Impacts: + = increasing or improving; - = decreasing or declining; 0 = no change or negligible.

Table S-2 Summary of Environmental Consequences, Comparison of Alternatives (continued)

Effects	Alternatives							
	PRMP	DRMP PA ¹	NA	A	B	C	D	E
Visual Resources (end of 10 years)	0	0	-	-	-	-	0	+
Wild and Scenic Rivers (study segments, 10 years)								
Number with outstandingly remarkable values beneficially affected	2	2	0	1	1	2	2	2
Number with outstandingly remarkable values unaffected	6	6	8	3	4	6	6	6
Number with outstandingly remarkable values adversely affected	0	0	0	4	3	0	0	0
Recreation Use (capacity to meet 10-year demand)								
Off-highway travel	yes	yes	yes	yes	yes	yes	yes	yes
Motorized travel	yes	yes	yes	yes	yes	yes	yes	yes
Nonmotorized travel	yes	yes	no	no	no	no	yes	yes
Camping	yes	yes	yes	no	no	yes	yes	yes
Hunting	yes	yes	yes	yes	yes	yes	yes	yes
Picnicking, studying nature, etc.	yes	yes	yes	yes	no	no	yes	yes
Fishing	yes	yes	yes	yes	yes	yes	yes	yes
Boating	yes	yes	yes	no	no	yes	yes	yes
Swimming, general waterplay, etc.	yes	yes	yes	no	no	yes	yes	yes
Winter sports	yes	yes	yes	yes	yes	yes	yes	yes
Snowmobiling	yes	yes	yes	yes	yes	yes	yes	yes
Timber								
Commercial forest land available for timber management (percent)	18	86	87	94	81	72	49	53

¹ Preferred alternative in draft resource management plan.

NA = No action alternative

Impacts: + = increasing or improving; - = decreasing or declining; 0 = no change or negligible.

Table S-2 Summary of Environmental Consequences, Comparison of Alternatives (continued)

Effects	Alternatives							
	PRMP	DRMP PA ¹	NA	A	B	C	D	E
Socioeconomic Conditions (annual average for expected life of plan)								
Planning area jobs dependent on BLM resource production (baseline - 2,330)	510	NE	2,360	3,230	2,780	1,150	1,170	1,360
Planning area personal income dependent on BLM resource production (millions of dollars; baseline - 49.3)	9.1	NE	47.8	66.0	56.3	22.9	23.2	26.9
Western Oregon O&C receipts distributed to counties (millions of dollars; baseline - 63.4)	25.8	NE	130.0	169.4	154.2	48.1	54.1	39.7

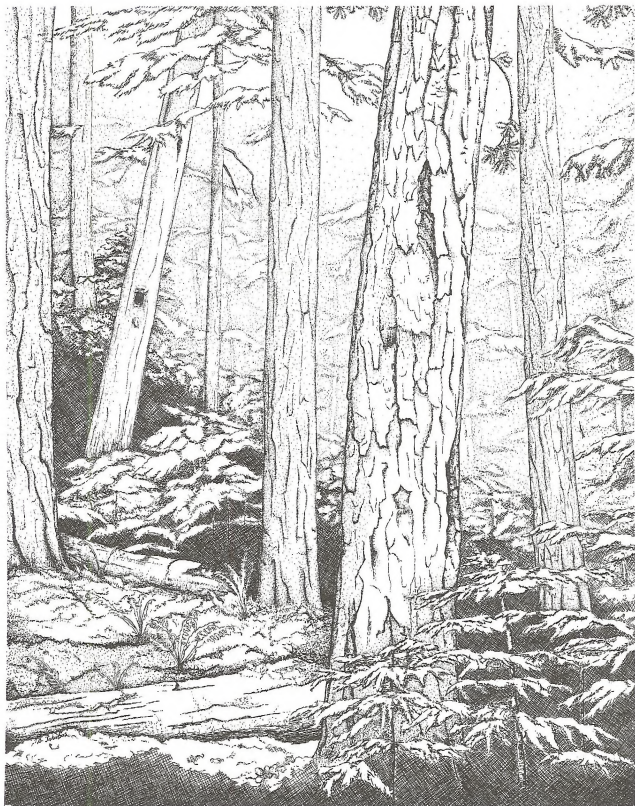
¹ Preferred alternative in draft resource management plan.

NA = No action alternative

NE = No estimate

Chapter 1

Introduction



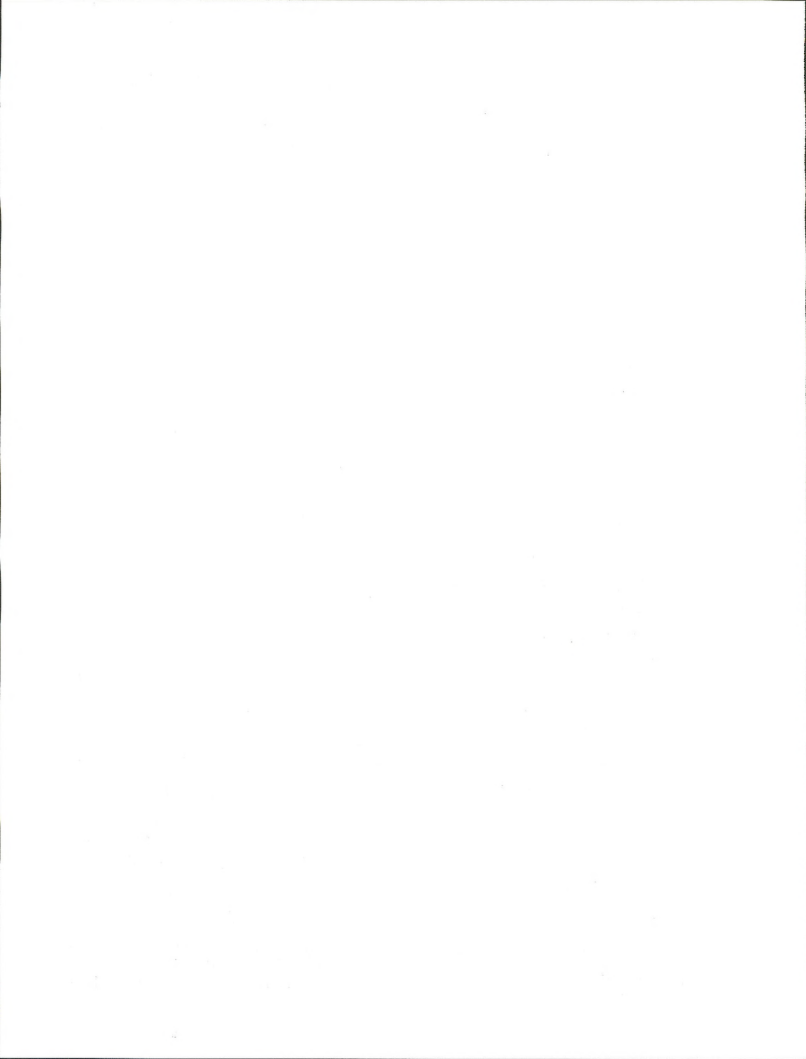


Table of Contents

Chapter 1 - Introduction

Major Changes from Chapter 1 of the Draft Resource Management Plan	1-1
The Planning Area	1-1
Purpose and Need	1-1
Relationship of the Resource Management Plan to BLM Policies, Programs, and Other Plans	1-3
Planning Process and Criteria	1-4
Issues and Concerns and Other Planning Considerations Eliminated from Detailed Study	1-4
Western Oregon Digital Data Base	1-6

1. The first part of the document is a list of names and addresses.

2. The second part of the document is a list of names and addresses.

3. The third part of the document is a list of names and addresses.

4. The fourth part of the document is a list of names and addresses.

5. The fifth part of the document is a list of names and addresses.

6. The sixth part of the document is a list of names and addresses.

7. The seventh part of the document is a list of names and addresses.

8. The eighth part of the document is a list of names and addresses.

9. The ninth part of the document is a list of names and addresses.

10. The tenth part of the document is a list of names and addresses.

11. The eleventh part of the document is a list of names and addresses.

12. The twelfth part of the document is a list of names and addresses.

13. The thirteenth part of the document is a list of names and addresses.

14. The fourteenth part of the document is a list of names and addresses.

15. The fifteenth part of the document is a list of names and addresses.

16. The sixteenth part of the document is a list of names and addresses.

17. The seventeenth part of the document is a list of names and addresses.

18. The eighteenth part of the document is a list of names and addresses.

19. The nineteenth part of the document is a list of names and addresses.

20. The twentieth part of the document is a list of names and addresses.

21. The twenty-first part of the document is a list of names and addresses.

22. The twenty-second part of the document is a list of names and addresses.

23. The twenty-third part of the document is a list of names and addresses.

24. The twenty-fourth part of the document is a list of names and addresses.

25. The twenty-fifth part of the document is a list of names and addresses.

26. The twenty-sixth part of the document is a list of names and addresses.

27. The twenty-seventh part of the document is a list of names and addresses.

28. The twenty-eighth part of the document is a list of names and addresses.

Major Changes from Chapter 1 of the Draft Resource Management Plan

- BLM-administered land in the Salem District has increased from 393,600 acres to 398,100 acres. Most of the increase is due to an exchange involving lands along the Molalla River.
- The Purpose and Need section explains that alternative 9 of the SEIS has been incorporated in the proposed resource management plan and the relationship of the alternative to the Oregon and California revested railroad lands act.

The Planning Area

The Salem District Proposed Resource Management Plan/Final Environmental Impact Statement (hereinafter referred to as the proposed resource management plan) is a description and analysis of managing approximately 398,100 acres of land in western Oregon administered by the U.S. Department of the Interior, Bureau of Land Management (BLM). There are also 27,800 acres of nonfederal land with federal subsurface mineral estate administered by the BLM.

BLM-administered lands in the planning area are primarily located in the western foothills of the Cascade Range and in the Oregon Coast Range (see maps 1-1 and 1-2). They are predominantly forested with stands of Douglas-fir, and drain into the Willamette River and a number of different coastal rivers. Population is centered in and near Portland and Salem.

The amount of BLM-administered land in the planning area by county is shown in table 1-1.

Purpose and Need

The proposed resource management plan responds to needs for forest habitat and forest products as discussed in the *Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related*

Table 1-1 BLM-Administered Land in the Planning Area (acres)

County	O&C ¹	Public Domain ²	Total
Benton	51,500	6,100	57,700
Clackamas	49,100	21,600	70,700
Clatsop	0	0	0
Columbia	11,000	0	11,000
Lane	8,600	400	9,000
Lincoln	8,400	11,800	20,200
Linn	68,300	2,200	70,500
Marion	20,800	200	21,000
Multnomah	4,200	0	4,200
Polk	40,500	200	40,700
Tillamook	37,400	10,800	48,200
Washington	11,600	300	11,900
Yamhill	33,000	0	33,000
Total	344,500	53,600	398,100

¹ Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

² Original federal lands which were not transferred to other jurisdictions and which continue to be managed by the United States.

³ Clatsop County and Yamhill County Public Domain lands less than 50 acres, so rounded to zero.

Source: MicroStorms data base.

Species within the Range of the Northern Spotted Owl, hereinafter referred to as the SEIS (U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994).

The need for forest habitat is the need for a healthy forest ecosystem with habitat that will support populations of native species and includes protection for riparian areas and waters. This need was reflected by President Clinton at the April 2, 1993, Forest Conference in Portland, Oregon.

The need for forest products from forest ecosystems is the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies and contribute valuable resources to the national economy, on a

predictable and long-term basis. This need also was reflected by President Clinton at the Forest Conference.

The proposed resource management plan identified in this document was developed after consideration of the following:

- public comments at open house meetings and in correspondence;
- comments from other government agencies;
- BLM staff analysis of the consequences of alternatives;
- legal mandates of federal laws and executive orders;
- decisions made in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and its Attachment A, hereinafter referred to as the SEIS record of decision (U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994a); and
- requirements of bureau policy.

The proposed resource management plan was developed under the requirements of the Federal Land Policy and Management Act through the use of an interdisciplinary planning process. This proposed resource management plan is written in compliance with the National Environmental Policy Act and related Council on Environmental Quality regulations.

A list of the major federal laws and executive orders affecting BLM land management in western Oregon is provided in appendix A.

The management of the Oregon and California revested railroad lands (hereinafter referred to as Oregon and California lands) is governed by a variety of statutes, including the Oregon and California Lands Act, the Federal Land Policy and Management Act, the Endangered Species Act, and the Clean Water Act. The Oregon and California Lands Act requires the Secretary of the Interior to manage Oregon and California lands for permanent forest production; however, such management must also be in accord with sustained-yield principles. Further, that Act requires that management of Oregon and California lands protect watersheds, regulate streamflow, provide for recreational facilities, and contribute to the economic stability of local communities and industries. The Act does not require the Secretary to harvest all old-growth timber or all commercial timber as rapidly as possible or according to any particular

schedule. The Secretary has discretion to determine how to manage the forest on a sustained-yield basis that provides for permanency of timber production over a long-term period. The Secretary must necessarily make judgments, informed by as much information as possible, about what kind of management will lead to permanent forest production that satisfies the principle of sustained yield.

Oregon and California lands must also be managed in accordance with other environmental laws such as the Endangered Species Act and the Clean Water Act. Some provisions of these laws take precedence over the Oregon and California Lands Act. For instance, the Endangered Species Act requires the Secretary to ensure that management of Oregon and California lands will not likely result in jeopardy to listed species or destruction or adverse modification of critical habitat. The Endangered Species Act directs the Secretary and all federal agencies to utilize their authorities to carry out programs for the conservation and recovery of listed species. Section 5(a) of the Act also directs: "the Secretary, and the Secretary of Agriculture with respect to the National Forest System, shall establish and implement a program to conserve fish, wildlife, and plants, including those which are listed as endangered species or threatened species pursuant to Section 4 of this Act," 16 U.S.C. § 1534(a). Although several northern spotted owl recovery plans have been proposed, the Secretary has not yet adopted final recovery plans for either the northern spotted owl or the marbled murrelet. The SEIS record of decision's Late-Successional Reserve and Riparian Reserve concepts are important building blocks in the development of recovery plans to achieve the conservation and recovery of those species.

One of the purposes of the Endangered Species Act is the preservation of ecosystems upon which endangered and threatened species depend. A forward-looking land management policy would require that federal lands be managed in a way to minimize the need to list species under the Endangered Species Act. Additional species listings could have the effect of further limiting the Oregon and California Lands Act's goal of achieving and maintaining permanent forest production. This would contribute to the economic instability of local communities and industries, in contravention of a primary objective of Congress in enacting the Oregon and California Lands Act. That Act does not limit the Secretary's ability to take steps now that would avoid future listings and additional disruptions.

Protection of watersheds and regulation of streamflow are explicit purposes of forest production under the Oregon and California Lands Act. Riparian Reserves, including those established on Oregon and California lands under the proposed resource management plan, are designed to restore and maintain aquatic ecosystem functions. Together with other components of the Aquatic Conservation Strategy, Riparian Reserves will provide substantial watershed protection benefits. Riparian Reserves will also help attain and maintain water quality standards, a fundamental aspect of watershed protection. Riparian Reserves and Late-Successional Reserves will help regulate streamflows, thus moderating peak streamflows and attendant adverse impacts to watersheds.

Relationship of the Resource Management Plan to BLM Policies, Programs, and Other Plans

The BLM in Oregon is developing five other proposed resource management plans. The six proposed resource management plans cover all BLM-administered lands in western Oregon. Some lands administered by the Eugene District directly adjoin lands being addressed in this plan. There is shared management of certain resource or administrative features (e.g., watersheds and road networks). The Salem and Eugene districts are cooperating in the planning for management of these adjoining lands.

The Salem District Draft Resource Management Plan/Environmental Impact Statement (hereinafter referred to as the draft proposed resource management plan) was supplemented by the SEIS. The SEIS record of decision, signed jointly by the Secretary of the Interior and the Secretary of Agriculture, requires BLM to incorporate the land-use allocations and standards and guidelines in that decision in the BLM's resource management plans for western Oregon. The proposed resource management plan is intended to be consistent with the SEIS record of decision; any apparent inconsistencies are oversights or misinterpretations of SEIS record of decision language. The

final SEIS describes the environmental impacts which would arise from those directions. This proposed resource management plan incorporates the analysis in that final SEIS.

The following management plans have been developed to respond to specific congressional mandates: Table Rock Wilderness, Yaquina Head Outstanding Natural Area, Salmon Wild and Scenic River, Sandy Wild and Scenic River, Quartzville Creek Wild and Scenic River, and the Clackamas Wild and Scenic River. The plan for the Clackamas Wild and Scenic River was prepared by the Forest Service with BLM as a cooperating agency. The basic management guidance for developing or implementing these plans would not be changed by any of the proposed resource management plan alternatives.

In 1987, the BLM completed a record of decision for its *Northwest Area Noxious Weed Control Program Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1987). This proposed resource management plan is tiered to the noxious weed statement. The decisions made in that record of decision are not addressed again in the proposed resource management plan alternatives.

This proposed resource management plan is similarly tiered to the *Western Oregon Program - Management of Competing Vegetation Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1989). The statement addresses the impacts of vegetation management activities on human health and all other impacts from the use of herbicides in management programs other than noxious weed control. The decisions made in that record of decision are also not readdressed.

This proposed resource management plan is also tiered to the *Pacific Yew Environmental Impact Statement* (U.S. Department of Agriculture, Forest Service 1993a), regarding analysis of impacts of harvest of Pacific yew. A copy of the key elements of the record of decision for that environmental impact statement is included as appendix B of this document. The decisions made in that record of decision are not readdressed.

Any finding made in the record of decision for this proposed resource management plan that certain river segments studied herein are suitable for designation under the Wild and Scenic Rivers act, will be a preliminary administrative finding. The finding will receive further review and possible modification by the Director, BLM; Secretary of the Interior; or the

President of the United States. To facilitate the review, after completion of this resource management plan and its record of decision, the BLM may elect or be required to prepare a study report to support recommendations to Congress for designation of specific rivers or river segments. Final decisions have been reserved by Congress unless the Governor nominates a river to the Secretary of the Interior, who may then decide to designate it.

There is one wilderness instant study area in the planning area, the 80-acre Little Sink Research Natural Area. A study of this area was completed and sent to Congress as part of a national package of instant study areas in 1985. Congress has taken no action on these instant study areas. Pending congressional action, the wilderness values of Little Sink will be protected.

Planning Process and Criteria

The BLM's planning process involves the following nine steps:

1. Identify issues, concerns, and opportunities.
2. Develop planning criteria.
3. Collect inventory data and information.
4. Analyze the management situation.
5. Formulate alternatives.
6. Estimate effects of alternatives.
7. Select the preferred alternative (and publish the draft resource management plan/environmental impact statement).
8. Select the resource management plan. Publish the proposed resource management plan/final environmental impact statement. Respond to any protest for the proposed resource management plan/final environmental impact statement.
9. Implement, monitor, and evaluate the resource management plan.

Publication of this document constitutes completion of step 8. Public involvement has occurred at several steps in the process (see appendix C, Public Involvement).

The planning process is designed to help the BLM identify the uses of BLM-administered lands desired by the public. It also assists the BLM in considering these uses to the extent consistent with the laws

established by Congress and the policies of the executive branch of the federal government regarding management of these lands.

Where the BLM manages only the subsurface mineral estate, the proposed resource management plan addresses only the management of BLM-administered minerals.

Planning criteria were developed by the BLM's Oregon state director for developing this proposed resource management plan and the other five western Oregon proposed resource management plans. These planning criteria are discussed in appendix D along with the criteria for formulation of alternatives.

Issues and Concerns and Other Planning Considerations Eliminated from Detailed Study

The alternatives addressed in the SEIS, but not selected in the SEIS record of decision, were eliminated from district-specific study because they were adequately considered in the SEIS.

A number of issues and concerns were identified through the early phases of public involvement in this planning process. Of particular relevance were public responses to a district scoping mailer of September 1986.

Issues

1. Timber Production Practices: Which forest lands should be available for timber management, and what practices should be used on those lands?
- 2 & 3. Old-Growth Forests and Habitat Diversity:
To what extent and where should old-growth and/or mature forest habitats be retained, maintained or reestablished to meet various resource objectives? To what extent and where should BLM manage habitat to support populations of native wildlife species?
4. Threatened and Endangered Species Habitat:
What should the BLM do to manage federally listed threatened or endangered plants and

animals and to prevent future federal listing of plants and animals as threatened or endangered species?

5. **Special Areas:** What areas on BLM-administered lands need special management to prevent irreparable damage to important historic, cultural or scenic values; to protect botanical or fish and wildlife resources or other natural systems or processes; and to protect life and safety from natural hazards? Which of these areas should be formally designated as areas of critical environmental concern?
6. **Visual Resources:** Which, if any, areas of BLM-administered lands should be managed to reduce visual impacts or enhance visual (scenic) quality?
- 7 & 8. **Streams/Riparian/Water Quality:** Where and how should riparian zones be managed to protect and improve water quality, fisheries and wildlife habitat? What actions should be undertaken to comply with state water quality standards? What should the BLM do to manage for special needs, such as municipal and domestic use?
9. **Recreation Resources:** What areas or sites should be designated and/or managed to protect or enhance a variety of recreational opportunities?
- 9a. **Wild and Scenic Rivers:** What rivers should be found suitable for designation?
10. **Land Tenure and Access:** In what areas would BLM-administered lands be sold, exchanged, or transferred out of federal ownership under other authorities to improve management efficiency and benefit resource program objectives? In what areas would the BLM attempt to acquire lands to improve management efficiency and benefit resource program objectives?
11. **Rural Interface Area Management:** Which BLM-administered lands should be allocated to receive special management practices due to the concerns of neighbors who live nearby?

The following issues were eliminated from consideration as primary factors in the formulation of alternatives, for the reasons cited:

- **Grazing/range management:** There are no grazing leases in the district, and no requests for leases are anticipated during the life of the proposed resource management plan.
- **Mineral resources:** Mineral development activity on BLM-administered lands in the planning area has been insignificant in recent years. It is expected to continue to be minor and manageable.

Concerns

- What areas should be available or designated as utility or transportation corridors or sites? What areas will be designated as avoidance or exclusion areas for different forms of rights-of-way including roads, powerlines, pipelines, cables, communication sites, small-scale energy facilities and timber access roads?
- What areas should be open, restricted, or closed to surface occupancy and closed or withdrawn from mineral entry, sale or lease?
- Where will the BLM land use allocations override or be inconsistent with plans, programs, or policies of state, local, or tribal governments in order to conform with federal natural resource policies, executive orders, or laws?
- How will the BLM land use allocations and management direction differ between Public Domain and Oregon and California lands?
- Should resource management plans ensure that subsequent management, including individual timber sales, specific forest management practices, etc., is likely to be cost efficient?
- What critical review of Timber Production Capability Classification withdrawals will be made?
- How will timber harvest levels be monitored?
- How will the BLM coordinate with state and local agencies?
- Will the resource management plan consider the potential for site degradation under long-term intensive timber management?
- Will the resource management plan assess cumulative effects of timber management on BLM and adjacent non-BLM lands?
- How will any reductions in the BLM harvest volume impact receipts to the Oregon and California counties?

The following concerns were eliminated from study for the reasons cited:

- **Use of herbicides:** This topic was fully analyzed in the environmental impact statements for management of competing vegetation and northwest area noxious weed control.
- **Effects on wilderness:** Other than the fully protected Table Rock Wilderness and the interim protected Little Sink Wilderness Instant Study Area, there are no wilderness values on BLM-administered lands in the district.
- **Effects on agriculture:** BLM activities in the planning area are not expected to have measurable effects on agriculture.

- Effects on wind and hydropower resources: There are no known wind power or hydropower proposals affecting BLM-administered lands in the planning area that are legally implementable.

Three effects, sometimes perceived as relevant planning topics, were eliminated from study for the following reasons:

- No discernible effects are anticipated on prime and unique farm lands, wilderness, and paleontological resources.
- Effects on off-reservation Indian tribal treaty rights: No such treaty rights involve BLM-administered lands in the Salem District.
- Previous analyses, e.g., the *Westside and Eastside Salem Timber Management Environmental Impact Statements* (U.S. Department of the Interior, BLM 1983a and b) have shown that effects of BLM management activities on energy use in the planning area are not significant.

Western Oregon Digital Data Base

To support the resource management plan process, the BLM developed the Western Oregon Digital Data Base, a Geographic Information System digital computer data base.

Due to the checkerboard pattern of land ownership, base theme data was mapped on 7 million acres to obtain coverage of BLM's 2.4 million acres in western Oregon. All base themes were derived from 1985-1986 aerial photography and then digitized at 1:4,800 scale. Base data themes include transportation, gross vegetation, hydrology, topography, and cultural features. Base theme mapping, except topography, is complete. This information was mapped using Automated Digitizing System software. Resource data themes were mapped at a scale of 1:12,000 or more, depending on the theme. There are approximately 75 resource themes captured on the 2.4 million acres of BLM-administered lands in western Oregon. They include soils, forestry, big game, minerals, watersheds, spotted owls, and recreation. Additional themes will be added to meet future day-to-day resource management operational needs.

Although the majority of western Oregon BLM-administered lands are covered by the Western Oregon Digital Data Base project, there are 53 townships within the Salem District which have limited base coverage due to the small amount of

BLM acreage. BLM ownership is based on the Geographic Coordinate Database System. Maps were generated from this information directly in Automated Digitizing System. This ownership is computer generated. Therefore it may differ from scales displayed in other documents which were determined from BLM master title plats, and sometimes based on old surveys that have never been updated.

The BLM is using Geographic Information System technology based on the Map Overlay and Statistical System family of software on Prime computers. Many base and resource themes have data base information associated with them. The data base information is stored in attribute files, which are linked to the graphic files by a process called DBLINK.

To build the Western Oregon Digital Data Base, standards for each of the themes were developed and agreed upon by BLM's western Oregon districts. The Western Oregon Digital Data Base Data Entry Handbook was developed with district input to provide a comprehensive and concise set of instructions. They include quality control assurance, so that all of the data themes are standard from district to district.

There are actually two Western Oregon Digital Data Bases: one for doing the resource management plans, in which the data is frozen in time; and one for operational uses, in which the data will be updated. Updating the Western Oregon Digital Data Base data is important because of the numerous changes required for many of the resource themes, particularly roads and operations inventory.

The Western Oregon Digital Data Base has been used in three ways in the planning effort:

- to compute and aggregate resource data for each planning area, and display maps of that data;
- to help design alternatives in accordance with criteria established for alternative formulation and to display maps of those alternatives; and
- to facilitate analysis of some of the consequences of those alternatives.

Chapter 2

Description of the Alternatives



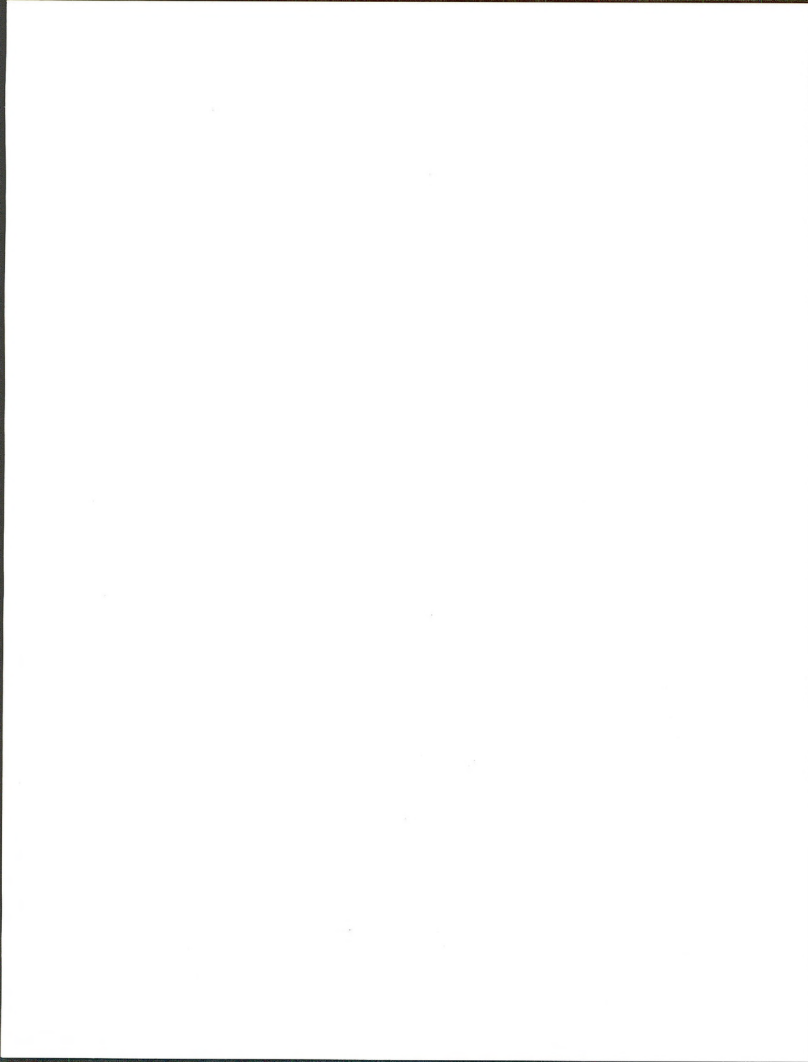


Table of Contents

Chapter 2

Description of the Alternatives

Major Changes from Chapter 2 of the Draft Resource Management Plan	2-1
Alternatives to be Analyzed and Alternatives Dropped from Detailed Study	2-1
Introduction	2-1
The Proposed Resource Management Plan	2-1
Ecological Principles for Management of Late-Successional Forests	2-16
Aquatic Conservation Strategy	2-17
Land Use Allocations and Resource Programs	2-19
Management Actions/Direction for All Major Land Use Allocations and Resource Programs	2-19
Major Land Use Allocations	2-20
Riparian Reserves	2-21
Late-Successional Reserves	2-27
Adaptive Management Area	2-31
Matrix	2-32
Resource Programs	2-34
Air Quality	2-34
Water and Soils	2-34
Wildlife Habitat	2-37
Fish Habitat	2-40
Special Status and SEIS Special Attention Species and Habitat	2-41
Special Areas	2-46
Cultural Resources Including American Indian Values	2-49
Visual Resources	2-50
Wild and Scenic Rivers	2-50
Wilderness	2-52
Rural Interface Areas	2-52
Socioeconomic Conditions	2-54
Recreation	2-54
Timber Resources	2-59
Special Forest Products	2-61
Energy and Minerals	2-63

Resource Programs (continued)

Land Tenure Adjustment	2-66
Rights-of-Way	2-68
Access	2-69
Withdrawals	2-70
Roads	2-75
Noxious Weeds	2-77
Hazardous Materials	2-77
Fire/Fuels Management	2-78

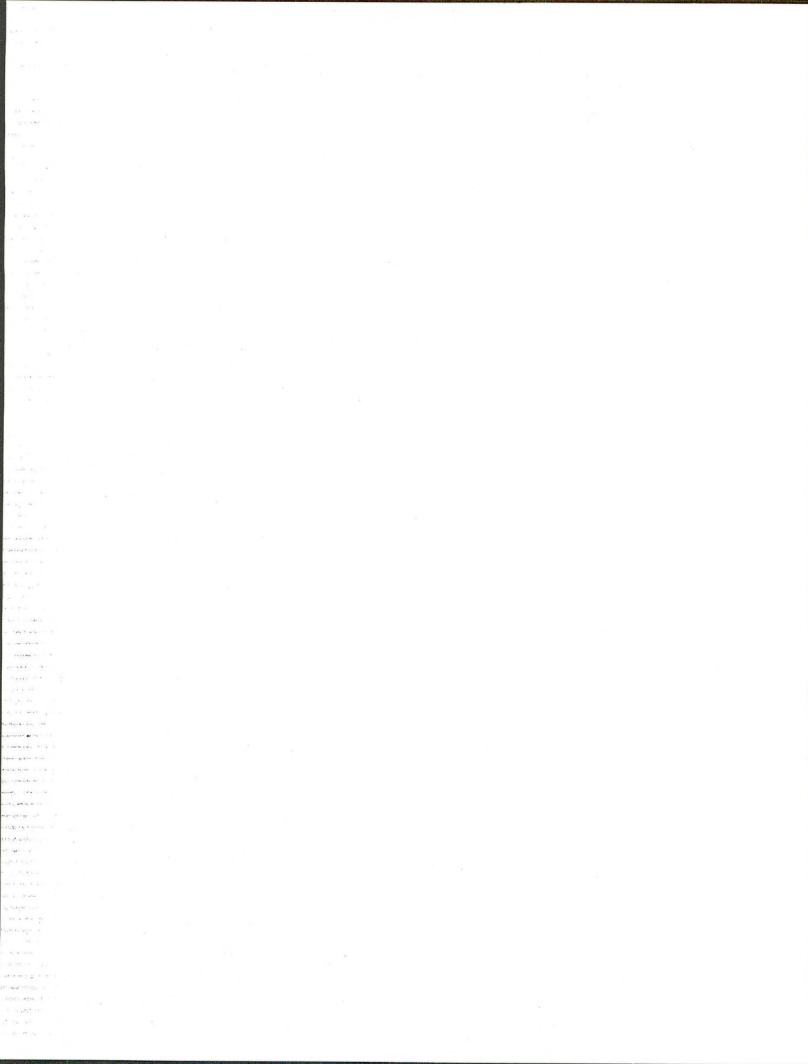
Management Direction Common to Alternatives A through E

General	2-80
Water Quality and Riparian Zones	2-81
Timber	2-82
Special Status Species Habitat	2-86
Special Areas	2-87
Recreation	2-87
Wild and Scenic Rivers	2-88
Wilderness	2-88
Visual Resources	2-88
Cultural Resources Including American Indian Values	2-89
Land Tenure	2-90
Rights-of-Way	2-91
Access	2-91
Withdrawals	2-92
Energy and Minerals	2-92
Roads	2-93
Noxious Weeds	2-93
Hazardous Materials	2-94
Fire	2-94
Wildfire Suppression	2-94

Management Direction by Alternative

Introduction	2-95
No Action Alternative	2-95
Alternative A	2-96
Alternative B	2-97
Alternative C	2-99
Alternative D	2-103

Coordination and Consultation	2-107
Use of the Completed Plan	2-108
Adaptive Management	2-109
Watershed Analysis	2-111
Requirement for Further Environmental Analysis	2-112
Management Assessments and Plans	2-114
Management of Newly Acquired Lands	2-114
Costs of Management	2-115
The Budget Link	2-115
Monitoring	2-115
Research	2-117



Major Changes from Chapter 2 of the Draft Resource Management Plan

- The proposed resource management plan, which is consistent with the SEIS record of decision, replaces the preferred alternative in the draft resource management plan.
- The description of the proposed resource management plan includes objectives, land use allocations, and management actions/direction in one location for reader convenience.
- Except for table 2-1, the alternatives comparison tables in chapter 2 of the draft resource management plan are not duplicated in this document.
- The discussion of probable timber sale quantity (formerly allowable sale quantity) has been moved to chapter 4.

Alternatives to be Analyzed and Alternatives Dropped from Detailed Study

The summary includes brief descriptions of the proposed resource management plan and six alternatives for which impacts are analyzed in chapter 4. A more detailed description of each alternative can be found in the remainder of this chapter.

Allocations and management by alternative are compared in table 2-1 (see pages following). Land use allocation acres in table 2-1 overlap each other and are not additive. Land use allocation acres in the text are gross acres (i.e., overlaps with other allocations are not taken out).

In scoping the plan, a number of alternatives or potential elements of alternatives, were considered but eliminated from detailed analysis. These alternatives are discussed in appendix C (Public Involvement).

Introduction

The purpose of this chapter is to describe the Salem District proposed resource management plan and the other land and resource management alternatives that were analyzed by BLM. The chapter has four major sections:

- a description of the objectives, major land use allocations, and management actions/direction for the proposed resource management plan;
- a description of management direction common to alternatives A through E;
- a description of six other management alternatives; and
- guidance for miscellaneous topics such as coordination and consultation, use of the completed plan, and monitoring.

All chapter 2 maps are located in the accompanying map packet.

The Proposed Resource Management Plan

The proposed resource management plan was developed partially in response to public comments related to BLM's August 1992 draft resource management plans for western Oregon. In addition the proposed plan incorporates the land use allocations and management direction from the SEIS record of decision.

Vision

The BLM will manage the natural resources under its jurisdiction in western Oregon to maintain healthy, diverse, and productive ecosystems so that present and future generations may continue to benefit from the public lands.

There are several basic principles supporting this vision:

- natural resources can be managed to provide for human use and a healthy environment;
- resource management must be focused on ecological principles to reduce the need for single resource or single species management;

Table 2-1 Comparison of Allocations and Management Actions by Alternative

	PRMP ¹	DRMP PA ²	No Action ³
Water Quality and Riparian Zones³			
Riparian Management Area			
Protection (average width in feet on each side of stream)			
Stream Order: First	--5	--6	
Second	--5	--6	
Third	--5	105 ⁶	
Fourth	--5	150	
Fifth	--5	210	
Sixth+	--5	240	
Lakes, ponds, and other waters	--5	150	
Riparian Reserves/Riparian Management Area (acres)	221,800	40,600	23,400

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.⁴ First and second order perennial streams would have average 75-foot Riparian Management Area.⁵ Permanent and intermittent streams and other waters would be allocated as Riparian Reserves with varying widths (see chapter 2, Riparian Reserves).⁶ First, second, and third order fish-bearing streams would average 150-foot Riparian Management Area.⁷ Riparian Management Area for intermittent streams.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A ⁴	B ⁴	C ⁴	D ⁴	E ⁴
				50 ⁷
			60 ⁷	60 ⁷
75	75	105	140	200
75	100	150	200	200
75	140	210	280	280
75	160	240	320	320
75	100	150	200	400
24,300	28,800	36,000	45,400	57,700

Table 2-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Old-Growth and Mature Forest Habitat³			
Management Decision	Manage 55 percent of the land as Late-Successional Reserves. Manage 7 percent as Connectivity/Diversity Blocks.	Manage 47 percent of the land as old-growth emphasis areas. Manage 11 percent of the land as connectivity areas.	Manage older forest retention areas as allocated in 1983 plans (no harvest).
Area managed for retention and development of older forest (acres)	219,700	221,500	79,000
Area managed for maintenance of older forest characteristics (acres)	27,400	33,300	0
Older forest retained end of first decade (acres)	107,600	98,600	77,700

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
	Contribute to habitat diversity and old growth in a corridor system with blocks of 640 acres connected by 80-acre stepping-stone blocks.	Manage for retention and improvement of biological diversity maintaining 18 percent of the land in restoration and retention blocks.	Manage as recommended by the 1990 Conservation Strategy for the northern spotted owl.	Contribute to habitat diversity by protecting existing stands over 150 years old, suitable spotted owl habitat within two miles of each spotted owl site and additional habitat to benefit amphibians and pileated woodpeckers.
59,900	103,900	132,400	209,100	196,700
0	0	238,600	0	0
68,900	75,600	96,800	105,200	92,000

Table 2-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Timber³			
Forest Management Allocations (acres of commercial forest land):			
Intensive or General Forest Management Area	50,800	109,600	278,000
Restricted	10,700	39,700	9,900
Enhancement of other uses or not available	273,500	180,000	41,400
Practices (assumed average annual acres for first decade):			
Regeneration harvest	600	2,400	3,100
Commercial thinning/density management harvest	910	980	500
Site preparation			
Prescribed fire	480	1,640	2,320
Other	590	240	470
Stand maintenance/protection	3,130	1,840	2,640
Release/precommercial thinning	2,970	2,120	2,790
Brushfield/hardwood conversion	90	250	100
Planting/regular stock	480	660	1,370
Planting/genetically selected stock	450	1,870	2,050
Fertilization	600	1,460	3,810
New road construction (miles / acres) first ten years	5 / 26	16 / 90	11 / 60
Probable sale quantity (million cubic feet)	5.7	21.5	37.2
Probable sale quantity (million board feet)	34.8	136.5	239.2
Miscellaneous volume (million cubic feet)	0.7	N / A	N / A
Miscellaneous volume (million board feet)	4.0	N / A	N / A

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.

N / A = Not applicable.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
311,000	264,900	0	0	132,700
0	2,100	238,600	161,800	41,400
18,300	62,300	90,700	167,500	155,200
4,560	4,000	1,800	1,800	2,100
420	410	2,600	280	330
3,010	3,010	410	1,320	1,570
930	600	720	270	310
3,870	3,400	970	1,500	1,770
4,100	3,610	1,190	1,590	1,880
430	390	190	160	220
2,920	2,330	920	110	510
2,100	2,100	920	1,820	1,780
4,150	3,870	3,140	0	2,160
16 / 90	12 / 600	18 / 100	9 / 50	8 / 50
51.9	43.9	17.1	17.3	20.1
333.8	280.5	107.0	106.7	127.1
N / A	N / A	N / A	N / A	N / A
N / A	N / A	N / A	N / A	N / A

Table 2-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Special Status Species Including Threatened and Endangered Species Habitat³			
Management Direction	Manage habitats of federal candidate, state-listed and bureau sensitive species on all BLM-administered lands. ⁴	Same as PRMP.	
Acres managed so as not to contribute to need to list	398,100	393,600	79,000
Wildlife (Including Fisheries) Habitat³			
Special habitat buffers (feet)	Equivalent to alternative C	100-200	0
Fish habitat improvement (miles)	54	54	20
Forage seeding (acres/year)	200-500	200-500	400-700
Special Areas³			
Existing ACEC/RNA retained (number / acres)	6 / 2,797	6 / 2,797	6 / 2,797
New ACEC/RNA designated (number / acres)	2 / 690	2 / 690	0 / 0
Total ACEC/RNA (number / acres)	8 / 3,487	8 / 3,487	6 / 2,797
Other existing ACEC retained (number / acres)	13 / 4,428	13 / 8,666	14 / 9,061
Other new ACEC designated (number / acres)	6 / 680	5 / 709	0 / 0
Total other ACEC (number / acres)	19 / 5,108	18 / 9,375	14 / 9,061
Other existing Special Areas retained (number / acres)	2 / 259	2 / 259	2 / 259
Other new Special Areas allocated (number / acres)	1 / 5	2 / 585	0 / 0
Total other Special Areas (number / acres)	3 / 264	4 / 844	2 / 259

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.⁴ Under the proposed resource management plan, SEIS special attention species will also be protected.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
Protect habitats of federal candidate, state-listed, and bureau sensitive species where such mitigation would not diminish commercial use.	Same as A plus protect those habitats on public domain lands.	Same as B plus additional protection provided by management for older forests.	Protect habitats of federal candidate, state-listed, and bureau sensitive species on all BLM-administered lands.	Same as D.
59,900	145,600	158,700	398,100	398,100
0	0	100-200	100-300	100-300
54	54	54	54	54
0	400-800	200-400	200-300	200-400
0 / 0	6 / 2,797	6 / 2,797	6 / 2,797	6 / 2,797
0 / 0	1 / 556	2 / 690	2 / 690	2 / 690
0 / 0	7 / 3,353	8 / 3,487	8 / 3,487	8 / 3,487
1 / 106	14 / 4,823	14 / 4,823	14 / 9,061	14 / 9,061
1 / 10	2 / 415	7 / 831	7 / 831	7 / 831
2 / 116	16 / 5,238	21 / 5,654	21 / 9,959	21 / 9,959
1 / 76	2 / 259	2 / 259	2 / 259	2 / 259
0 / 0	1 / 5	1 / 5	1 / 5	2 / 585
1 / 76	3 / 264	3 / 264	3 / 264	3 / 264

Table 2-1 Comparison of Allocations and Management Actions by Alternative

	PRMP ¹	DRMP PA ²	No Action
Recreation Resources³			
Recreation sites			
Existing (number / acres)	12 / 800	12 / 766	12 / 766
Potential (number / acres)	10	14	1
Trails			
Existing (number / miles)	8 / 47	7 / 26	7 / 26
Potential (number)	11	6	6
Special Recreation Management Areas			
Existing (number / acres)	4 / 1,800	1 / 5,300	1 / 5,300
New (number / acres)	7 / 70,800	6 / 16,382	0 / 0
Area open to off-highway vehicle use (acres)	129,900	287,700	333,700
Area limited to off-highway vehicle use (acres)	229,200	75,100	50,500
Area closed to off-highway vehicle use (acres)	39,000	30,800	9,400
Wild and Scenic Rivers³			
River segments found suitable for designation as:			
Recreational (number / miles)	2 / 27.7	2 / 27.7	0 / 0
Scenic (number / miles)	0 / 0	0 / 0	0 / 0
Wild (number / miles)	0 / 0	0 / 0	0 / 0

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
2 / 633	12 / 766	12 / 766	12 / 766	12 / 766
0	6	12	12	14
2 / 18	2 / 18	3 / 19	7 / 26	7 / 26
0	0	1	1	6
0 / 0	1 / 1,062	1 / 1,062	1 / 5,300	1 / 5,300
0 / 0	1 / 406	2 / 725	3 / 3,042	6 / 18,751
331,000	319,200	310,600	292,600	262,100
41,800	48,600	56,000	71,000	99,200
20,700	25,800	27,000	30,000	32,300
0 / 0	3 / 28.5	3 / 28.5	4 / 34.8	5 / 51.2
0 / 0	0 / 0	1 / 3.0	2 / 12.9	2 / 12.9
0 / 0	0 / 0	0 / 0	1 / 3.0	1 / 3.0

Table 2-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Visual Resources³			
Management Decision	Manage congressionally designated and other high value, highly sensitive areas as VRM class I. Manage high value, moderately sensitive areas as VRM class II. Manage other areas as VRM classes III and IV.	Same as PRMP.	Manage visual resources in accordance with 1983 plans.
Area managed as VRM class I (acres)	14,100	14,700	0 ⁴
Area managed as VRM class II (acres)	22,800	24,600	15,900
Area managed as VRM class III (acres)	59,600	58,100	62,500
Area managed as VRM class IV (acres)	301,600	296,200	298,000
Land Tenure³			
Management Decision	Make exchanges of O&C lands to contribute to biological diversity or to enhance timber management. Substantial acres of O&C forest land available for timber management would not be exchanged for lands to be managed for a single purpose. Sell public domain lands and O&C lands other than available commercial forest land, meeting criteria of Federal Land Policy and Management Act section 203(a). Make leases to accommodate other appropriate uses.	Same as PRMP.	Pursue sales, exchanges and transfers as defined in 1983 plans.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
Manage available forest lands as VRM class IV and all other lands as inventoried.	Manage available forest lands as inventoried within 1/4-mile of recreation sites, state and federal highways and designated rivers. Manage other available forestland as VRM class IV. Manage all other lands as inventoried.	Same as A except on available forest lands where BLM-administered land is more than half of a watershed, manage as inventoried.	Manage all lands as inventoried.	Same as D except manage as VRM class III all lands inventoried as class IV, and manage as class I all lands within 1/4-mile of recreation sites, state and federal highways and designated rivers.
10,400	17,000	17,200	17,200	21,400
12,600	21,800	34,300	67,900	80,600
10,800	19,700	49,100	52,200	291,600
359,800	335,100	293,000	256,300	0
Make exchanges to enhance non-declining timber harvest level on BLM-administered lands. Sell or lease no commercial timberland.	Make exchanges of O&C lands emphasizing opportunities primarily to enhance timber management opportunities. Sell public domain lands and O&C lands other than available commercial forestlands, meeting criteria of Federal Land Policy and Management Act section 203(a). Make leases to accommodate other appropriate uses.	Same as B except also make exchanges to contribute to conservation of biological diversity.	Emphasize exchanges to acquire lands with nontimber values. Sell lands other than available commercial forestlands, meeting criteria (1) or (2) of Federal Land Policy and Management Act section 203(a). Lease only under the Recreation and Public Purpose Act.	Same as D.

¹ Proposed resource management plan.

² Preferred alternative in draft resource management plan.

³ See narrative for management direction by alternative.

⁴ Although not allocated as VRM class I acres, areas such as Table Rock Wilderness are managed to the same standards as VRM class I areas.

VRM = Visual resource management.

Table 2-1 Comparison of Allocations and Management Actions by Alternative (continued)

	PRMP ¹	DRMP PA ²	No Action
Rights-of-Way³			
Rights-of-way exclusion areas (acres)	24,300	24,300	28,900
Rights-of-way avoidance areas (acres)	239,800	45,200	8,900
Energy and Mineral Resources³			
Area open to leasable energy/mineral development (acres)	391,900	387,400	387,400
Area closed to leasable energy/mineral development (acres)	6,200	6,200	6,200
Area open to locatable energy/mineral development (acres)	376,000	384,500	386,100
Area closed to locatable energy/mineral development (acres)	22,100	9,100	7,500
Area open to salable energy/mineral development (acres)	171,600	331,600	379,200
Area closed to salable energy/mineral development (acres)	226,500	62,000	14,400
Rural Interface Area Management³			
Area considered for alternative management practices (acres)	36,380+ ⁴	36,380+ ⁴	0
Area where clearcutting, herbicide spraying and prescribed burning is excluded (acres)	0	0	0
Area managed for VRM class II objectives (acres)	0	0	0
Area managed for VRM class III objectives (acres)	0	0	0

¹ Proposed resource management plan.² Preferred alternative in draft resource management plan.³ See narrative for management direction by alternative.⁴ BLM-administered lands adjacent to areas zoned for lots larger than 40 acres would also be considered for alternative management practices.

VRM = Visual resource management.

Table 2-1 Comparison of Allocations and Management Actions by Alternative

A	B	C	D	E
16,200	39,100	53,100	106,300	112,100
16,500	26,500	26,800	26,800	31,000
387,400	387,400	387,400	387,400	387,400
6,200	6,200	6,200	6,200	6,200
386,300	384,900	384,700	383,300	382,900
7,300	8,700	8,900	10,300	10,700
377,600	372,300	370,600	358,200	358,400
16,000	21,300	23,000	35,400	35,200
0	3,400	17,500	0	0
0	0	0	17,500	36,400
0	0	0	16,900	31,800
0	2,300	14,900	0	0

- stewardship, the involvement of people working with natural processes, is essential for successful implementation;
- the BLM cannot achieve this vision alone but can, by its management processes and through cooperation with others, be a significant contributor to its achievement; and
- a carefully designed program of monitoring, research and adaptation will be the change mechanism for achieving this vision.

Strategy

Lands administered by the BLM will be managed to maintain healthy, functioning ecosystems while providing a sustainable production of natural resources. This management strategy, called ecosystem management, involves the use of ecological, economic, social, and managerial principles to ensure the sustained condition of the whole. Ecosystem management emphasizes the complete ecosystem instead of individual components and looks at sustainable systems and products that people want and need. It seeks a balance between maintenance and restoration of natural systems and sustainable yield of resources.

The building blocks for this strategy are comprised of several major land use allocations - Riparian Reserves, Late-Successional Reserves, Adaptive Management Areas, and Matrix which includes General Forest Management Areas and Connectivity/Diversity Blocks. These land use allocations are located and configured in the landscape to support overall ecosystem function and to meet the vision for management of federal lands in western Oregon. Additional allocations include a variety of special purpose management areas such as recreation sites, wild and scenic rivers, and visual resource management areas.

Each land use allocation will be managed according to specific objectives and management actions/direction. During initial implementation of the plan, the stated objectives and management actions/direction will provide the rules and limits governing actions and the principles specifying the environmental conditions or levels to be achieved and maintained. As the BLM gains experience in implementing the plan and applying the concepts of adaptive management, the stated objectives and management actions/direction may be refined for specific geographic areas.

The land use allocations of the proposed resource management plan are as follows:

Land Allocations/Classifications	Acres ¹
Late-Successional Reserves	
Outside the Adaptive Management Area	132,100
Inside the Adaptive Management Area ²	79,700
Other Adaptive Management Area ² (NonLSR)	43,700
General Forest Management Area	107,300
Connectivity/Diversity Blocks	27,400
Other ³	<u>7,900</u>
Total	398,100

¹ There are 221,800 acres of Riparian Reserves underlying all of the allocations/classifications shown in this chart. Overlaps could not be eliminated due to limitations in the database. There are no overlaps in the other acres.

² Total Adaptive Management Area acreage is 123,400.

³ This category includes a District-Designated Reserve and Table Rock Wilderness.

Maps 2-1, 2-2a, and 2-2b show the land use allocations of the proposed resource management plan.

There are two major management concepts underlying the objectives and management actions/direction - Ecological Principles for Management of Late-Successional Forests and the Aquatic Conservation Strategy. These concepts are summarized below.

Ecological Principles for Management of Late-Successional Forests

One goal of the proposed resource management plan is to maintain late-successional and old-growth species habitat and ecosystems on federal lands. A second goal is to maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations.

All land use allocations described in this proposed resource management plan will contribute to these two goals. For instance, Late-Successional Reserves, Riparian Reserves, and special management areas (e.g., areas of critical environmental concern) will be managed to enhance and/or maintain late-successional forest conditions. The General Forest

Management Area and Connectivity/Diversity Blocks will be managed to retain coarse woody debris, green trees, snags, and some late-successional forest. These and other land use allocations and resource programs are described in detail below.

See the SEIS record of decision (appendix E) for additional information about ecological principles for management of late-successional forests.

Aquatic Conservation Strategy

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy will protect salmon and steelhead habitat on federal lands managed by the Forest Service and the BLM within the range of the Pacific Ocean anadromy.

The Aquatic Conservation Strategy is designed to meet the following objectives:

- Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
- Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, up slope areas, headwater tributaries, and intact refugia. These lineages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

- Maintain and restore the sediment regime under which an aquatic ecosystem evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
- Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (i.e., movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
- Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
- Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

The components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration.

Riparian Reserves

See Riparian Reserves in the Land Use Allocation section.

Key Watersheds

A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat and areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program.

There are two types of Key Watersheds - Tier 1 and Tier 2. Tier 1 watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program.

Tier 1 Key Watersheds in the district and BLM-administered acres in each watershed are as follows:

Key Watershed Name	Approx. Acres
Clackamas River Corridor	400
Collawash River	800
Drift Creek (Alsea)	1,100
Drift Creek (Siletz)	2,000
Elkhorn Creek (Trask)	2,200
Fish Creek	200
Kilchis River	3,300
Little North Santiam River	13,600
Lower North Fork Wilson River	1,400
North Fork Siletz River	4,400
Salmon River	1,400
Tobe Creek	1,800
Upper Lobster Creek	13,500
Upper Nestucca River	35,800
Yachats	70
Total	81,970

See map 2-2a for locations of Key Watersheds.

Tier 2 watersheds do not contain at-risk fish stocks, but they are important sources of high quality water. The Tier 2 watersheds in the Salem District are Bull Run River and Eagle Creek.

Key Watersheds overlay other land use allocations in the district and place additional management requirements or emphasis on activities in those areas.

Management Actions/Direction

- Prior to further resource management activity, including timber harvest, in Key Watersheds, prepare watershed analyses. Until watershed analyses can be completed, proceed with minor activities, such as those categorically excluded under the National Environmental Policy Act regulations (except timber harvest). If they are consistent with Aquatic Conservation Strategy objectives. Apply Riparian Reserve management actions/direction.

- Reduce existing road mileage within Key Watersheds. If funding is insufficient to implement reductions, neither construct nor authorize through discretionary permits a net increase in road mileage in Key Watersheds.
- Give highest priority to watershed restoration in Key Watersheds.

Watershed Analysis

See Watershed Analysis section (toward the end of this chapter) and the SEIS record of decision (appendix E) for requirements.

Watershed Restoration

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity. Other restoration opportunities include meadow and wetland restoration and mine reclamation.

Management Actions/Direction

- Prepare watershed analyses and plans prior to restoration activities. See Watershed Analysis section (toward the end of this chapter).
- Focus watershed restoration on removing some roads and, where needed, upgrading those that remain in the system.
- Apply silvicultural treatments to restore large conifers in Riparian Reserves.
- Restore stream channel complexity. In-stream structures will only be used in the short term and not as a mitigation measure.

Additional information about the Aquatic Conservation Strategy is found in the SEIS record of decision (appendix E).

Land Use Allocations and Resource Programs

This section provides a description of objectives, land use allocations, and management actions/direction for the proposed resource management plan. The term "land use allocations" is used in two ways. First, it pertains to the major land use allocations derived from the SEIS and its record of decision (e.g., Riparian Reserves and Late-Successional Reserves) and the still relevant allocations of the Salem District Draft Resource Management Plan. The second use pertains to data and text describing specific allocations (e.g., acres, miles, and number of sites) under each major land use allocation and resource program.

The rest of this Land Use Allocations and Resource Programs section has three major parts:

- Management actions/direction for all major land use allocations and resource programs;
- Major land use allocations - objectives, allocations, and management actions/direction for each major land use allocation; and
- Resource programs - objectives, allocations, and management actions/direction for each resource program.

Although described separately, each of these elements contributes collectively and cumulatively to meeting the overall management strategy and must be considered together to accurately reflect the concept of ecosystem management. There is some duplication of objectives and management actions/direction for major land use allocations and resource programs. A reader interested in either topic will find a basic package of related management guidance in one location.

Most resource programs have basic requirements for activities such as inventory, site-specific analysis, planning, and environmental assessment prior to project implementation and monitoring after project implementation. Inherent in the proposed resource management plan is a BLM commitment to continue these activities in the future. For the sake of simplifying text, these activities are generally not repeated in the management actions/direction that follow.

A summary of the land use allocations and management actions/direction for the proposed resource management plan is found in table 2-1. Most land use allocations are shown on the chapter 2 maps in the accompanying map packet.

Management Actions/Direction for All Major Land Use Allocations and Resource Programs

The SEIS record of decision provides guidance for six topics which apply to all land use allocations. Guidance for four of these topics is found under Recreation, Fire/Fuels Management, and Range Resources in the Resource Programs section and in the Research section (toward the end of this chapter). Guidance for the other two topics is described below.

All management actions/direction in this proposed resource management plan are subject to refinement through planning based on watershed analysis and the adaptive management process. In some areas, land use allocations overlap. A hierarchy of allocations and related management actions/direction will be used to guide plan implementation (see the SEIS record of decision, appendix E).

Survey and Manage for SEIS Special Attention Species (Amphibians, Mammals, Bryophytes, Mollusks, Vascular Plants, Fungi, Lichens, and Arthropods)

Survey and manage for SEIS special attention species within the range of the species and the particular habitats that they are known to occupy. Appendix F lists which species are covered by this provision, and which of the following four categories and management actions/direction are to be applied to each:

1. Manage known sites (highest priority).
 - Acquire and manage information on known sites, make it available to all project planners, and use it to design or modify activities.
 - Protect known sites. For some species, apply specific management treatments such as prescribed fire.
 - For rare and endemic fungus species, temporarily withdraw 160 acres around known sites from ground-disturbing activities until the sites can be thoroughly surveyed and site-specific measures prescribed.

- Establish management areas of all useable habitat up to 600 acres around two currently unprotected locations of *Oxyporus nobilissimus*. Protect these populations until the sites can be thoroughly surveyed and site-specific measures prescribed. Protection will be undertaken immediately.
2. Survey prior to management activities and manage sites.
 - Continue existing efforts to survey and manage rare and sensitive species habitat.
 - For species without survey protocols, start immediately to design protocols and implement surveys.
 - Within the known or suspected ranges and within the habitat types of vegetation communities associated with the species, survey for Larch Mountain salamanders and red tree voles. These surveys will precede the design of all ground-disturbing activities that will be implemented in 1997 or later.
 - For the other species listed in appendix F, begin development of survey protocols promptly and proceed with surveys as soon as possible. These surveys will be completed prior to ground-disturbing activities that will be implemented in fiscal year 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the SEIS.
 - Conduct surveys at a scale most appropriate to the species.
 - Develop management actions/direction to manage habitat for the species on sites where they are located.
 - Incorporate survey protocols and proposed site management in interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.
3. Conduct extensive surveys and manage sites.
 - Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement.
 - Conduct surveys according to a schedule that is most efficient and identify sites for protection at that time.
 - Design these surveys for efficiency and develop standardized protocols.
 - Begin these surveys by 1996.

4. Conduct general regional surveys.

- Survey to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens.
- Initiate these surveys no later than fiscal year 1996 and complete them within ten years.

Protection Buffers

Provide protection buffers for specific rare and locally endemic species and other species in the upland forest matrix. A list of these species is found in appendix F and related management actions/direction are described in the Special Status and SEIS Special Attention Species and Habitat section. These species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside reserves that will be important to protect as well.

Apply the following management actions/direction:

- Develop survey protocols that will ensure a high likelihood of locating sites occupied by these species.
- Following development of survey protocols and prior to ground-disturbing activities, conduct surveys within the known or suspected ranges of the species and within the habitat types or vegetation communities occupied by the species. See the previous Survey and Manage section for an implementation schedule.
- When located, protect the occupied sites.

See Special Status and SEIS Special Attention Species and Habitat section for additional details.

Major Land Use Allocations

This section describes the land use allocations developed for the SEIS record of decision. The allocations applicable to BLM-administered lands are Riparian Reserves, Late-Successional Reserves, Adaptive Management Areas, and Matrix.

Two of the allocations in the SEIS record of decision, Congressionally Reserved Areas and Administratively Withdrawn Areas, are simply recognition of valid resource management decisions in existing or proposed plans. These allocations are fully incorporated in the resource program elements of this

proposed resource management plan. They are not described as separate land use allocations in this document.

Congressionally reserved areas are Yaquina Head Outstanding Natural Area, Table Rock Wilderness and four designated wild and scenic rivers - Clackamas, Salmon and Sandy rivers and Quartzville Creek.

The types of administratively withdrawn areas in the district include air navigation site, lighthouse, fish hatchery, seed orchard, special recreation management area, communication site, research natural area, electric power generation facility, potential power development area, and some Timber Production Capability Classifications.

Land use allocation acres in the text are gross acres (i.e., overlaps with other allocations are not taken out).

Riparian Reserves

The following material summarizes management direction for Riparian Reserves. Details regarding this direction are found in the SEIS record of decision (appendix E).

Objectives

See Aquatic Conservation Strategy Objectives.

Provide habitat for special status, SEIS special attention and other terrestrial species.

Land Use Allocations

There are approximately 221,800 acres of Riparian Reserves in the district. Calculation of these acres is based on prescribed widths and estimated miles of stream in the various categories described in the SEIS record of decision. The widths are intended to provide a high level of fish, wildlife and plant habitat and riparian protection until watershed and site analysis can be completed. Although Riparian Reserve boundaries on permanently flowing streams may be adjusted, they are considered to be the approximate widths necessary for attaining Aquatic Conservation Strategy objectives. Post-watershed analysis Riparian Reserve boundaries for permanently flowing streams will approximate the widths described below. Following watershed analysis, Riparian Reserve boundaries for intermittent streams may be different from the existing boundaries.

Determination of final boundaries will be based on hydrologic, geomorphic and ecologic processes in a watershed affecting intermittent streams. The widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site-specific analysis is conducted and described, and the rationale for final Riparian Reserve boundaries is presented through the appropriate National Environmental Policy Act decision-making process.

The initial Riparian Reserve widths are as follows:

Fish-bearing streams. Riparian Reserves consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300-foot slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

Permanently flowing non-fish-bearing streams. Riparian Reserves consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150-foot slope distance, whichever is greatest.

Seasonally flowing or intermittent streams, wetlands less than one acre, and unstable and potentially unstable areas. This category applies to features with high variability in size and site-specific characteristics. At a minimum the Riparian Reserve will include:

- the extent of unstable and potentially unstable areas;
- the stream channel and the area extending to the top of the inner gorge;
- the stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation;
- the area extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100-foot slope distance, whichever is greatest.

Constructed ponds and reservoirs, and wetlands larger than one acre. Riparian Reserves consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal

to the height of one site-potential tree, or to 150-feet slope distance from the edge of a wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.)

Lakes and natural ponds. Riparian Reserves consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300-feet slope distance, whichever is greatest. (Riparian vegetation and seasonally saturated soils will generally constitute a wetland and will be managed as prescribed for wetlands.)

Riparian Reserves are illustrated in figure 2-1.

Management Actions/Direction

As a general rule, management actions/direction for Riparian Reserves prohibit or regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives. Watershed analysis and appropriate National Environmental Policy Act compliance will be required to change Riparian Reserves in any watershed.

Implement the following management actions/direction in Riparian Reserves. (Management actions/direction in this section are supplemented by Best Management Practices in appendix G.)

General

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

Timber Management

Neither conduct nor allow discretionary timber harvest, including fuelwood cutting, in Riparian Reserves, with exception of the following:

- Where catastrophic events such as fire, flooding, volcanic eruptions, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.

- Remove salvage trees only when watershed analysis determines that present and future woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected.
- Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Riparian Reserve acres are not included in calculations of the probable sale quantity.

Roads Management

Cooperate with federal, state, and county agencies and work with private parties with road use agreements to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

- completing watershed analyses including appropriate geotechnical analyses (i.e., examining soil and rock conditions in riparian and stream crossings) prior to construction of new roads or landings in Riparian Reserves;
- minimizing road and landing locations in Riparian Reserves;
- preparing road design criteria, elements, and standards that govern construction and reconstruction;
- preparing operation and maintenance criteria that govern road operation, maintenance, and management; minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
- restricting sidecasting as necessary to prevent the introduction of sediment to streams; and
- avoiding wetlands entirely when constructing new roads.

Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:

- reconstructing roads and associated drainage features that pose a substantial risk;
- prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected; and

Note: Illustration is not to scale.

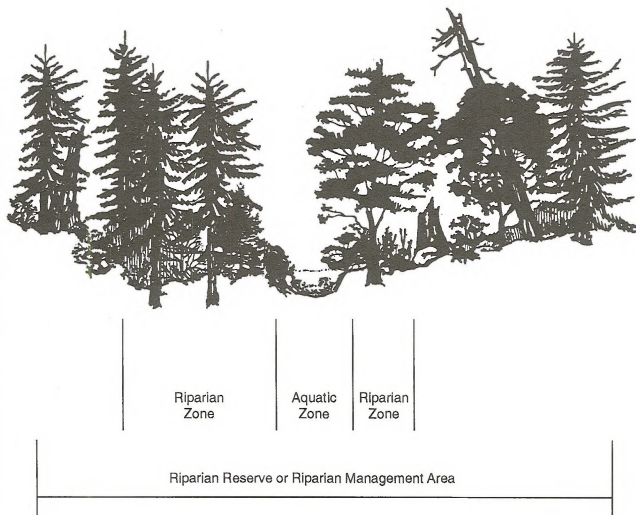


Figure 2-1 Riparian Reserve or Riparian Management Area

Management Actions/Direction (continued)

- closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

Design and construct new culverts, bridges and other stream crossings and improve existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions. New structures and improvements will be designed to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

Minimize sediment delivery to streams from roads. Outsliping of the roadway surface is preferred, except in cases where outsliping would increase sediment delivery to streams or where outsliping is infeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (e.g., streams which can be made available to anadromous fish by removing obstacles to passage).

Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan will include provisions for the following activities:

- inspections and maintenance during storm events;
- inspections and maintenance after storm events;
- road operation and maintenance giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources;
- traffic regulation during wet periods to prevent damage to riparian resources; and
- establishing the purpose of each road by developing the Road Management objective.

Recreation Management

Design new recreational facilities within Riparian Reserves, including trails and dispersed sites, so as not to prevent meeting Aquatic Conservation Strategy

objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impacts to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives.

Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.

Address attainment of Aquatic Conservation Strategy objectives in wild and scenic river and wilderness management plans.

Minerals Management

NOTE: The following management actions/direction differ from the standards and guidelines in the SEIS record of decision, since the standards and guidelines are not all implementable under current laws and regulations. The stronger standards and guidelines in the SEIS record of decision (see appendix E) will be adopted at such time as changes in current laws and/or regulations authorize their implementation.

For any proposed locatable mining operation in Riparian Reserves, other than notice level (activity on less than five acres) or casual use, require the following actions by the operator consistent with 43 Code of Federal Regulations 3809:

- Prepare a Plan of Operations, including a reclamation plan and reclamation bond for all mining operations in Riparian Reserves. Such plans and bonds will address the costs of removing facilities, equipment, and materials; recontouring of disturbed areas to an approved topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvaging and replacing topsoil; and revegetating to meet Aquatic Conservation Strategy objectives.
- Locate structures, support facilities, and roads outside Riparian Reserves. If no alternative to siting facilities in Riparian Reserves exists, locate in a way compatible with Aquatic Conservation Strategy objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Roads will be constructed and maintained to meet road management standards and to minimize damage to resources in Riparian

Reserves. When a road is no longer required for mineral or land management activities, it will be reclaimed. In any case, access roads will be constructed consistent with 43 Code of Federal Regulations 3809 and acceptable road construction standards and will minimize damage to resources in Riparian Reserves.

- Avoid locating solid and sanitary waste facilities in Riparian Reserves. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, if releases can be prevented, and if stability can be ensured, then:
 - Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.
 - Locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in Riparian Reserves.
 - Reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
 - Monitor waste and waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
 - Require reclamation bonds adequate to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.

Where an existing operator is in noncompliance at the notice level (i.e., causing unnecessary or undue degradation), require actions similar to those stated above to meet the intent of 43 Code of Federal Regulations 3809.

For leasable mineral activity in Riparian Reserves, prohibit surface occupancy for oil, gas, and geothermal exploration and development activities where leases do not exist. Where possible, adjust the stipulations in existing leases to eliminate impacts that retard or prevent the attainment of Aquatic Conservation Strategy objectives, consistent with existing lease terms and stipulations.

Allow development of salable minerals, such as sand and gravel, within Riparian Reserves only if Aquatic Conservation Strategy objectives can be met.

Develop inspection and monitoring requirements and include such requirements in exploration and mining plans and in leases or permits consistent with existing laws and regulations. Evaluate the results of inspection and monitoring to determine if modification of plans, leases and permits is needed to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Fire/Fuels Management

Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies will recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management activities could be damaging to long-term ecosystem function.

Locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside of Riparian Reserves. If the only suitable location for such activities is within the Riparian Reserve, an exemption may be granted following a review and recommendation by a resource advisor. The advisor will prescribe the location, use conditions, and rehabilitation requirements. Utilize an interdisciplinary team to predetermine suitable incident base and helibase locations.

Minimize delivery of chemical retardant, foam, or other additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor, when an escape would cause more long-term damage.

Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by a wildfire or a prescribed fire burning outside prescribed parameters.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

Management Actions/Direction (continued)

Locate and manage water drafting sites (e.g., sites where water is pumped to control or suppress fires) to minimize adverse effects on riparian habitat and water quality as consistent with Aquatic Conservation Strategy objectives.

Lands

Identify instream flows needed to maintain riparian resources, channel conditions, and fish passage.

Issue leases, permits, rights-of-way, and easements to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where legally possible, adjust existing leases, permits, rights-of-way, and easements to eliminate adverse effects that retard or prevent the attainment of Aquatic Conservation Strategy objectives. If adjustments are not effective and where legally possible, eliminate the activity. Priority for modifying existing leases, permits, rights-of-way and easements will be based on the actual or potential impact and the ecological value of the riparian resources affected.

Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives and facilitate restoration of fish stocks and other species at risk of extinction.

For proposed hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission (the Commission), provide timely, written comments regarding maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity. Request the Commission to locate proposed support facilities outside of Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to the Commission that ensure Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, provide recommendations to the Commission that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves should be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives.

For other hydroelectric and surface water development proposals in Tier 1 Key Watersheds, require instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. For other hydroelectric and surface water development proposals in all other watersheds, give priority emphasis to instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies.

General Riparian Area Management

Identify and attempt to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

Fall trees in Riparian Reserves when they pose a safety risk. Keep trees on site when needed to meet coarse woody debris objectives.

Apply herbicides, insecticides, other toxicants, and other chemicals only in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and instream flows needed to maintain riparian resources, channel conditions, and fish habitat.

Watershed and Habitat Restoration

Design and implement watershed restoration projects in a manner that promotes long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and attains Aquatic Conservation Strategy objectives.

Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based coordinated resource management plans or other cooperative agreements to meet Aquatic Conservation Strategy objectives.

Prevent watershed and habitat degradation rather than relying on mitigation measures or planned restoration.

Fish and Wildlife Management

Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing fish and wildlife interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

Cooperate with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, harvest and poaching that threaten the continued existence and distribution of native fish stocks inhabiting streams with adjacent or nearby federal lands.

Late-Successional Reserves

The following material summarizes management direction for Late-Successional Reserves. Details regarding this direction are found in the SEIS record of decision (appendix E).

Objectives

Protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth forest-related species including the northern spotted owl and marbled murrelet.

Maintain a functional, interacting, late-successional and old-growth forest ecosystem.

Land Use Allocations

There are approximately 211,800 acres of mapped Late-Successional Reserves in the Salem District. Of this total, 79,700 acres are in the Northern Coast Range Adaptive Management Area and 5,800 acres are in Table Rock Wilderness.

An additional 1,800 acres of District-Designated Reserve will be managed the same as Late-Successional Reserves. Although not included in the allocations of the SEIS record of decision, the District-Designated Reserve is a logical addition to an adjacent Late-Successional Reserve on Forest Service land.

The six components of the Late-Successional Reserve system in the Salem District are:

- **Mapped Late-Successional Reserves.**
These reserves incorporate Key Watersheds to the extent practicable; some or parts of the Late-Successional/Old Growth 1 and 2 areas identified by the Scientific Panel on Late-Successional Forest Ecosystems; and some or parts of the Designated Conservation Areas from the Final Draft Spotted Owl Recovery Plan.
- **Late-Successional/Old Growth 1 and 2 areas** within marbled murrelet zone 1 as mapped by the Scientific Panel on Late-Successional Forest Ecosystems.
- **In the Northern Coast Range Adaptive Management Area**, certain owl addition areas as mapped by the Scientific Panel on Late-Successional Forest Ecosystems.

Land Use Allocations (continued)

- **Occupied Marbled Murrelet Sites**
See Special Status and SEIS Special Attention Species and Habitat section.
- **Known Spotted Owl Activity Centers**
(as of January 1, 1994).
See Special Status and SEIS Special Attention Species and Habitat section.
- **Protection Buffers**
See Special Status and SEIS Special Attention Species and Habitat section.

See map 2-2b for locations of Late-Successional Reserves and the District-Designated Reserve. Occupied marbled murrelet sites and protection buffers are unmapped.

Management Actions/Direction

General

Manage the Late-Successional Reserve within the Northern Coast Range Adaptive Management Area as follows:

- Through the Adaptive Management Area plan, reconsider the designation and/or the management actions/direction established for all Late-Successional Reserves.
- If needed to create and maintain late-successional forest conditions, conduct thinning operations in forest stands up to the 110-year age class (106 to 115 years). This will be accomplished by precommercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown).

Manage the Late-Successional Reserve common to Table Rock Wilderness in accordance with the approved wilderness management plan.

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

Develop Late-Successional Reserve assessments prior to habitat manipulation. See Management Assessments and Plans (toward the end of this chapter) for additional information.

Plan and implement nonsilvicultural activities inside Late-Successional Reserves that are neutral or beneficial to the creation and maintenance of late-successional habitat.

Using interdisciplinary teams, evaluate other activities not described below and document appropriate guidelines.

Request review by the Regional Ecosystem Office of all activities deemed to have potential adverse effects on Late-Successional Reserve objectives. The Regional Ecosystem Office may develop additional criteria for exempting some additional activities from review.

Silviculture

Plan and implement silvicultural treatments inside Late-Successional Reserves that are beneficial to the creation of late-successional habitat.

If needed to create and maintain late-successional forest conditions, conduct thinning operations in forest stands up to 80 years of age. This will be accomplished by precommercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown).

Salvage

Limit salvage of dead trees in Late-Successional Reserves to areas where stand-replacing events exceed ten acres in size and canopy closure has been reduced to less than 40 percent.

Retain all standing live trees including those injured (e.g., scorched) but likely to survive.

Retain snags that are likely to persist until late-successional forest conditions have developed and a new stand is again producing large snags.

Retain adequate coarse woody debris quantities in a new stand so that in the future it will still contain amounts similar to naturally regenerated stands. Watershed-level or province-level plans will establish appropriate levels of coarse woody debris to be used. Levels will be typical and will not require retention of all material where it is highly concentrated or too small to contribute to coarse woody debris over the long term.

Remove snags and logs to reduce hazards to humans along roads and trails and in or adjacent to recreation sites. Leave some material where coarse woody debris is inadequate.

After disturbance in younger stands, develop diameter and biomass retention direction consistent with the intention of achieving late-successional forest conditions. Where green trees, snags, and logs are present following disturbance, the green tree and snag direction will be applied first and completely satisfied where possible. The biomass left in snags can be credited toward the amount of coarse woody debris biomass needed to achieve management objectives.

Retain logs present on the forest floor before a disturbance event.

Retain coarse woody debris to approximate the species composition of the original stand to help replicate preexisting suitable habitat conditions.

Deviate from these management actions/direction only to provide reasonable access to salvage sites and feasible logging operations. Limit deviations to as small an area as possible.

Road Construction and Maintenance

Construct roads in Late-Successional Reserves if the potential benefits of silviculture, salvage, and other activities exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be routed through unsuitable habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging, will be considered to provide access for activities in reserves.

Fall trees along rights-of-way if they are a hazard to public safety. Consider leaving material on site if available coarse woody debris is inadequate. Consider topping of trees as an alternative to felling.

Fuelwood Gathering

Permit fuelwood gathering only in existing cull decks, in areas where green trees are marked by silviculturists for thinning, in areas where blowdown is blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large

scale disturbance. In all cases these activities will comply with management actions/direction for salvage and silvicultural activities.

Mining

Assess the impacts of ongoing and proposed mining activities in Late-Successional Reserves.

Include stipulations in mineral leases and, when legally possible, require operational constraints for locatable mineral activities to minimize detrimental effects to late-successional habitat.

Developments

Neither construct nor authorize new facilities that may adversely affect Late-Successional Reserves.

Review on a case-by-case basis new development proposals that address public needs or provide significant public benefits. They may be approved when adverse effects can be minimized and mitigated. They will be planned to have the least possible adverse impacts on Late-Successional Reserves.

Locate new developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Retain and maintain existing developments, such as campgrounds, utility corridors, and communication sites, consistent with other management actions/direction for Late-Successional Reserves.

Remove hazard trees along utility rights-of-way and trails and in other developed areas.

Land Exchanges

Consider land exchanges in Late-Successional Reserves if they provide benefits equal to or better than current conditions.

Consider land exchanges especially to improve area, distribution, and quality (e.g., connectivity, shape, and contribution to biological diversity) of Late-Successional Reserves, especially where public and private lands are intermingled.

Habitat Improvement Projects

Design projects to improve conditions for fish, wildlife, and watersheds if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

Management Actions/Direction (continued)

Design projects for recovery of threatened or endangered species even if they result in some reduction of habitat quality for other late-successional species.

Design and implement watershed restoration projects consistent with Late-Successional Reserve objectives.

Fire Suppression and Prevention

As part of watershed analysis, plan fire management for each Late-Successional Reserve.

Emphasize maintaining late-successional habitat in wildfire suppression plans.

Use minimum impact suppression methods for fuels management in accordance with guidelines for reducing risks of large-scale disturbances.

During actual fire suppression activities, consult an interdisciplinary team to assure that habitat damage is minimized.

Until a fire management plan is completed for a Late-Successional Reserve or group of reserves, suppress wildfire to avoid loss of habitat and to maintain future management options.

Prepare a specific fire management plan prior to any habitat manipulation activities in Late-Successional Reserves. Specify how hazard reduction and other prescribed fire applications meet the objectives of the Late-Successional Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office.

Apply prescribed fire in a manner which retains the amount of coarse woody debris determined through watershed analysis.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

Special Forest Products

Evaluate whether special forest product harvest activities have adverse effects on Late-Successional Reserve objectives.

Prior to selling special forest products, ensure resource sustainability and protection of other resource values such as special status plant or animal species.

Where special forest product activities are extensive, evaluate whether they have significant effects on late-successional habitat. Restrictions may be appropriate in some cases.

Recreational Uses

Use adjustment measures, such as education, use limitations, traffic control devices, or increased maintenance, when dispersed and developed recreation practices retard or prevent attainment of Late-Successional Reserve objectives.

Rights-of-Way, Contracted Rights, Easements, and Special/Temporary Use Permits

Consider access to nonfederal lands through Late-Successional Reserves. Existing right-of-way agreements, contracted rights, easements and special/temporary use permits are valid uses in Late-Successional Reserves.

For all new rights-of-way proposals, design mitigation measures to reduce adverse effects on Late-Successional Reserves. Consider alternative routes that avoid Late-Successional Reserves. If rights-of-way must be routed through a reserve, design and locate them to have the least impact on late-successional habitat.

Review all special/temporary use permits. When objectives of Late-Successional Reserves are not being met, reduce impacts through education or modification of existing permits.

Nonnative Species

If introduction of a nonnative species is proposed, complete an assessment of impacts and avoid any introduction that would retard or prevent achievement of late-successional objectives.

Evaluate impacts of nonnative species (plant and animal) existing within reserves.

Develop plans and recommendations for eliminating or controlling nonnative species which are inconsistent with Late-Successional Reserve objectives. Include an analysis of effects of implementing such programs on other species or habitats within Late-Successional Reserves.

Protection Buffers

See the Special Status and SEIS Special Attention Species and Habitat section.

Adaptive Management Area

The following material summarizes Adaptive Management Area direction. Details regarding this direction are found in the SEIS record of decision (appendix E).

Objectives

Develop and test new management approaches to integrate and achieve ecological and economic health and other social objectives.

Contribute substantially to the achievement of SEIS record of decision objectives, including restoration and maintenance of late-successional forest habitat outside reserves, consistent with marbled murrelet guidelines; retention of key structural elements of late-successional forests on lands subjected to regeneration harvest; restoration and protection of riparian zones; and provision of a stable timber supply.

Land Use Allocations

There are approximately 123,400 acres of BLM-administered land in the Northern Coast Range Adaptive Management Area (see map 2-2a). Of this total 79,700 acres are designated as Late-Successional Reserve within the Adaptive Management Area. These acres include all Late-Successional/Old Growth 1 and 2 areas within marbled murrelet zone 1, and all owl additions, as mapped by the Scientific Panel on Late-Successional Forest Ecosystems.

Management Actions/Direction

Develop a plan for the Northern Coast Range Adaptive Management Area. See Management Assessments and Plans (toward the end of this chapter) for additional information.

During Adaptive Management Area planning, review relevant objectives, land use allocations, and management actions/direction for resource programs established in this proposed resource management plan. They may be modified in the Adaptive Management Area plan based on site-specific analyses. Otherwise, management actions/direction will be developed to meet the objectives of the Adaptive Management Area and the overall strategy. Development of management guidance will be coordinated with the Regional Ecosystem Office through the Regional Interagency Executive Committee.

Proceed with management activities in the adaptive management area while the plan is being developed. Initiation of activities will not be delayed by requirements for comprehensive plans or consensus documents beyond those needed to meet existing legal requirements for activities.

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

With one exception, manage mapped and unmapped Late-Successional Reserves in accordance with management actions/direction stated previously. The exception involves maximum thinning age. In this Adaptive Management Area, thinning to create and maintain late-successional forest conditions may occur up to the 110-year age class (106 to 115 years).

Design management activities around these reserves to reduce the risk of natural disturbances.

Protect riparian areas in a manner comparable to that prescribed for other federal land areas. Desired conditions may be achieved in a manner different than that prescribed for other areas, and research projects may be conducted within riparian zones. During analysis of Riparian Reserve widths, consider the contribution of these reserves to aquatic and terrestrial species. Through watershed analysis, take into account all species that were intended to benefit by the prescribed Riparian Reserve widths (i.e., fish,

Management Actions/Direction (continued)

mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, American marten, red tree voles, bats, marbled murrelets, and northern spotted owls).

Manage coarse woody debris, green trees and snags in a manner which meets the intent of the management actions/direction for the Matrix. There are no specific management actions/direction for these forest components in the Adaptive Management Area.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance as follows:

- Minimize intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions. Prescribed fires should be planned to minimize the consumption of litter and coarse woody debris.
- Minimize soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment.
- Reduce the intensity and frequency of site treatments.

Provide for old-growth fragments in watersheds where little remains. The Matrix management action/direction for retaining late-successional forest in fifth field watersheds (see Matrix section for details) will be considered as a threshold for analysis in Adaptive Management Area planning rather than a strict management action/direction. The role of remaining late-successional forest stands will be fully considered in watershed analysis before they can be modified.

Explore and support opportunities to research the role and effects of fire/fuels management on ecosystem functions.

Emphasize fire/fuels management cooperation across agency and ownership boundaries.

Follow the hazard reduction management actions/direction in this proposed resource management plan (see Fire/Fuels Management section) until the Adaptive Management Area plan is completed.

Use accepted wildfire suppression strategies and tactics and conform to specific agency policy.

Matrix (Connectivity/Diversity Blocks and General Forest Management Area)

Objectives

Produce a sustainable supply of timber and other forest commodities.

Provide connectivity (along with other allocations such as Riparian Reserves) between Late-Successional Reserves.

Provide habitat for a variety of organisms associated with both late-successional and younger forests.

Provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

Provide early successional habitat.

Land Use Allocation

In the Matrix, there are approximately 107,300 acres of BLM-administered land in the General Forest Management Area and approximately 27,400 acres in Connectivity/Diversity Blocks. Connectivity/Diversity Blocks vary in size and are distributed throughout the Matrix. See map 2-2a for the locations of these land allocations.

Management Actions/Direction

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

Conduct timber harvest and other silvicultural activities in that portion of the Matrix with suitable forest lands, according to management actions/direction summarized below and in the Timber section.

Conduct timber harvest so as to provide a renewable supply of large down logs well distributed across the Matrix landscape in a manner that meets the needs of species and provides for ecological functions. Down logs will reflect the species mix of the original stand. Specific measures to accomplish this are as follows:

- Leave 240 linear feet of logs per acre greater than or equal to 20 inches in diameter. Logs less than 20 feet in length will not be credited toward this goal. Decay class 1 and 2 logs will be credited toward the total. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.
- In areas of partial harvest, apply the same basic management actions/direction, but they can be modified to reflect the timing of stand development cycles where partial harvest is practiced.
- Retain coarse woody debris already on the ground and protect it to the greatest extent possible from disturbance during treatment (e.g., slash burning and yarding) which might otherwise destroy the integrity of the substrate.
- Minimize intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions. Prescribed fires should be planned to minimize the consumption of litter and coarse woody debris.
- Minimize soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment.
- Reduce the intensity and frequency of site treatments.

Retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center for all known (as of January 1, 1994) spotted owl activity centers (see map 3-5).

Additional information about Matrix management is found in the SEIS record of decision (appendix E).

Retain green trees and snags throughout the General Forest Management Area as follows:

- Retain six to eight green conifer trees per acre in regeneration harvest units.
- Retain snags within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels. Meet the 40 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.
- In addition to the previous green tree retention management action/direction, retain green trees for snag recruitment in timber harvest units where there is an identified, near-term (less than three decades) snag deficit. These trees do not count toward green-tree retention requirements.

Provide Connectivity/Diversity Blocks spaced throughout the Matrix. Manage the blocks as follows:

- Maintain 25 to 30 percent of each block in late-successional forest at any point in time. Riparian Reserves and other allocations with late-successional forest count toward this percentage. Blocks may be comprised of contiguous or noncontiguous BLM-administered lands. The size and arrangement of habitat within a block will provide effective habitat to the extent possible.
- Manage available forest land within each block on a 150-year area control rotation.
- When an area is regeneration harvested, retain 12 to 18 green trees per acre.

Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance. Plan and implement treatments to:

Resource Programs

The following section includes objectives, land use allocations, and management actions/direction for the resource uses and programs which BLM manages in the Salem District. Some of the management actions/direction in the previous land use allocation section are repeated in this section. The intent of this duplication is to give a reader a package of related management guidance in one location.

Air Quality

Objectives

Continue efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan.

Maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the state implementation plan.

Reduce the potential for wildfire emissions through the use of prescribed fire and other fuels management techniques.

Land Use Allocations

None.

Management Actions/Direction

By the year 2000, reduce particulate matter emissions and impacts from prescribed burning by 50 percent from the baseline period (1976-1979). This will be accomplished by planning, conducting, monitoring, and, if necessary, adjusting prescribed fire activities in accordance with the Oregon state implementation plan and the Oregon Smoke Management Plan (see Fire/Fuels Management section).

Reduce broadcast burning in favor of lower intensity under burning. Use emission reduction mitigation measures and smoke dispersal techniques to the greatest extent practical. Wildfire hazard reduction, site preparation, and the use of prescribed fire for species habitat mitigation will be implemented in a manner consistent with ecosystem management.

Consider alternative emission reduction techniques whenever they are compatible with land allocation objectives and other management actions/direction. See the Air Quality Analysis section of the SEIS for alternative treatments that may be considered during fuels management project design.

Where needed, use dust abatement measures on roads during BLM timber harvest operations or other BLM commodity hauling activity. Encourage dust abatement measures when haulers use BLM roads under permits and right-of-way agreements.

Promote burning of dry fuelwood through activities such as making available copies of Oregon Department of Environmental Quality publications to fuelwood purchasers.

Water and Soils

Objectives

See Aquatic Conservation Strategy, Riparian Reserve and Key Watershed objectives.

As directed by the Clean Water Act, comply with state water quality requirements to restore and maintain water quality to protect the recognized beneficial uses in district watersheds.

Improve and/or maintain soil productivity.

Land Use Allocations

None specifically for water quality or soils. However, Riparian Reserves, Key Watershed provisions, and Timber Production Capability Classifications will assist in meeting water quality and soils management objectives.

Management Actions/Direction - General

Improve and/or maintain soil and water conditions by closing selected areas to vehicle use and/or limiting such use to existing or designated roads and trails. See Recreation, Off-Highway Vehicle Areas, and Roads sections for additional details.

Management Actions/Direction - Water

See Management Actions/Direction for Riparian Reserves and Key Watersheds (located in Aquatic Conservation Strategy section).

Continue to implement a nonpoint source management program in cooperation with the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality.

Continue coordination with the Oregon Department of Environmental Quality for implementation of best management practices which protect beneficial uses of water.

Ensure consistency of management activities with the *Oregon Water Management Program* (Oregon Water Resources Commission 1990) for forest practices and with Oregon's water quality criteria and guidelines (Oregon Administrative Rule 340-41).

Protect flood plains and wetlands in accordance with Executive Orders 11988 and 11990 and the *Riparian-Wetlands Initiative for the 1990s* (U.S. Department of the Interior, BLM, WO 1991). Design and implement watershed restoration projects that promote long-term ecological integrity of ecosystems, conserve the genetic integrity of native species, and attain Aquatic Conservation Strategy objectives. See Aquatic Conservation Strategy for additional guidance.

Cooperate with federal, state, local, and tribal agencies and private landowners to develop watershed-based coordinated resource management plans or other cooperative agreements to meet Aquatic Conservation Strategy objectives.

Prevent watershed degradation rather than using mitigation or planned restoration to correct foreseeable problems caused by management activities. See best management practices in appendix G for additional guidance.

Identify and attempt to obtain instream flows needed to maintain riparian resources, channel conditions, aquatic habitat, and water quality.

Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions and fish habitat.

Apply herbicides, insecticides, and other chemicals in a manner that avoids impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives.

Apply for water rights to support the needs for fire suppression, construction/maintenance (e.g., pump chances, water holes, and reservoirs) and other programs as appropriate.

Management Actions/Direction - Soils

Apply best management practices during all ground- and vegetation-disturbing activities. See appendix G for a list of practices.

Minimize disturbance of identified fragile sites. Figure 2-2 is an illustration of how fragile sites are defined and classified in the Timber Production Capability Classification System. Appendix G includes a summary of management guidance for fragile sites.

When aerial or cable systems are used, suspend one or both ends of logs above the ground for all or part of their length during most of the yarding operation.

In timber sale areas involving ground yarding systems, use existing skid trails as much as possible. As a general rule, limit new skid trails to slopes less than 35 percent and limit tractor operation on skid trails to periods of low soil moisture content when resistance to soil compaction is greater. Require operators to minimize the extent of soil displacement during logging. At the time of regeneration harvest, till compacted areas with a properly designed, self-drafting winged subsoiler. For entries other than regeneration harvest, consider tilling skid trails with the same equipment where it can be done with minimum damage to roots of reserve trees.

During site preparation, avoid using prescribed fire on soils recognized as unusually erodible, nutrient deficient, or low in organic matter. On other soils, design prescriptions to protect beneficial soil properties (e.g., prescribed fires of low and moderate intensity). As a general rule, conduct burning operations when large fuels are moist and small fuels are dry.

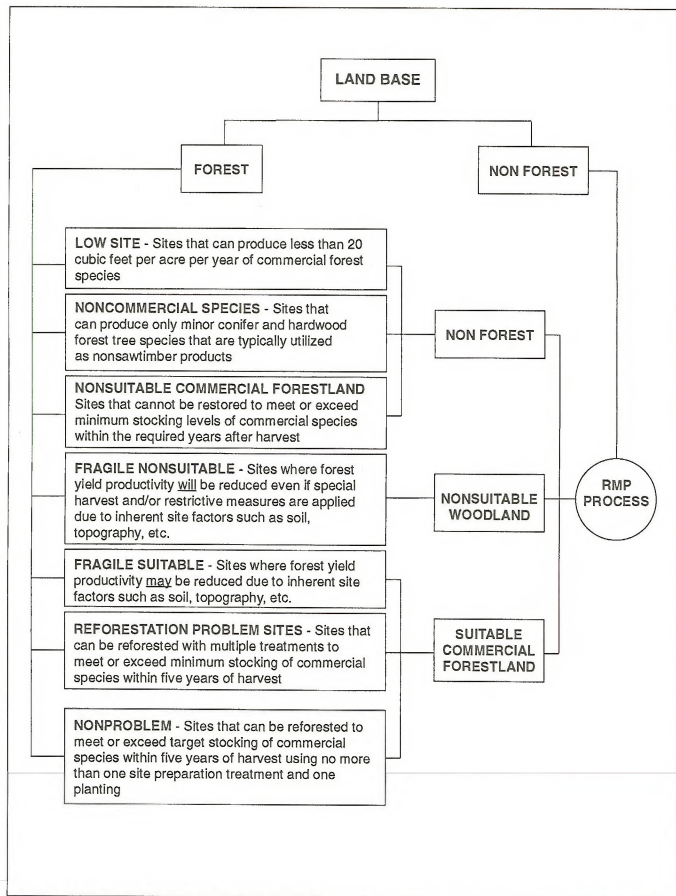


Figure 2-2 Timber Production Capability Classification Categories

Management Actions/Direction (continued)

Use the following guidelines for mechanical site preparation:

- Minimize piling of large woody material;
- Avoid displacing duff layers and topsoil into piles or windrows;
- Limit tractor use to one round trip over the same area; and
- Operate only when soil moisture content is below specified levels, to minimize soil compaction. Restrict track-type equipment with a brush blade to areas with suitable soil types and slopes less than 35 percent. Use low-ground pressure backhoes, loaders, grapples or other special equipment that would cause insignificant soil compaction impacts, especially on steeper slopes (30 to 45 percent) and soils susceptible to damage from compaction and topsoil displacement. Till compacted areas with approved, rear-mounted winged subsoiler equipment.

Wildlife Habitat

Objectives

See Late-Successional Reserve, Riparian Reserve and Matrix objectives.

Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations.

Land Use Allocations

The land use allocations in this proposed resource management plan are designed to benefit wildlife species, in the aggregate, that use the various seral stages and other habitat areas of the forest.

Management Actions/Direction - All Land Use Allocations

Use the watershed analysis process to address wildlife habitat issues for individual watersheds. The analysis will help to resolve any concerns identified in applying management actions/direction in this section and those in the Special Status and SEIS Special

Attention Species and Habitat section. Where appropriate, wildlife habitat enhancement opportunities will be identified through this process. Types of enhancement opportunities include providing downed wood, gating and/or obliterating roads, seeding elk forage, creating permanent elk forage areas, creating snags, and restoring wetlands.

Coordinate with the Oregon Department of Fish and Wildlife during planning and implementation of wildlife habitat enhancement projects.

Cooperate with federal, tribal and state wildlife management agencies to identify and eliminate impacts associated with habitat manipulation, poaching, and other activities that threaten the continued existence and distribution of native wildlife inhabiting federal lands.

Management Actions/Direction - Riparian Reserves

Design and implement wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct and operate wildlife interpretive and other use-enhancement facilities, such as interpretive trails, in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing wildlife interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

Management Actions/Direction - Late-Successional Reserves

Design projects to improve conditions for wildlife if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

Management Actions/Direction (continued)

If introduction of a nonnative species is proposed, complete an assessment of impacts and avoid any introduction that would retard or prevent achievement of Late-Successional Reserve objectives.

Evaluate impacts of nonnative species existing within Late-Successional Reserves.

Develop plans and recommendations for eliminating or controlling nonnative species which are inconsistent with Late-Successional Reserve objectives. Include an analysis of effects of implementing such programs on other species within Late-Successional Reserves.

Management Actions/Direction - Matrix (General Forest Management Area and Connectivity/Diversity Blocks)

Retain snags within a timber harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels. Meet the 40 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.

Management Actions/Direction - General Forest Management Area

Retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain six to eight green conifer trees per acre after regeneration harvest. Retained trees will be distributed in variable patterns (e.g., single trees, clumps and strips) to contribute to stand diversity.

In addition to the previous green tree retention management action/direction, retain green trees for snag recruitment in harvest units where there is an identified, near-term (less than three decades) snag deficit. These trees do not count toward green-tree retention requirements.

Leave 240 linear feet of logs per acre greater than or equal to 20 inches in diameter. Logs less than 20 feet in length will not be credited toward this total. Existing decay class 1 and 2 logs count toward this requirement. Down logs will reflect the species mix of original stands. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.

Management Actions/Direction - Connectivity/Diversity Blocks

Provide Connectivity/Diversity Blocks spaced throughout the BLM land base. Manage the blocks as follows:

- Maintain 25 to 30 percent of each block in late-successional forest at any point in time. The percentage of habitat will include habitat in other allocations, such as Riparian Reserves. Blocks may be comprised of contiguous or noncontiguous BLM-administered lands. The size and arrangement of habitat within a block should provide effective habitat to the extent possible.
- Retain 12 to 18 green conifer trees per acre when an area is regeneration harvested. Distribute the retained trees in variable patterns (e.g., single trees, clumps and strips) to contribute to stand diversity. The management goal for the retained trees and subsequent density management would be the recovery of old-growth characteristics in approximately 100 to 120 years.
- Leave 240 linear feet of logs per acre greater than or equal to 20 inches in diameter. Logs less than 20 feet in length will not be credited toward this total. Existing decay class 1 and 2 logs count toward this requirement. Down logs will reflect the species mix of original stands. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.

Management Actions/Direction - Special Habitats

Using interdisciplinary teams, identify special habitat areas and determine relevant values for protection or management on a case-by-case basis. Of particular importance in these determinations will be the habitat of species for which the SEIS record of decision provides protection buffers or other site-specific management actions/direction.

Use management practices, including fire, to obtain desired vegetation conditions in special habitats.

Management Actions/Direction - Owls, Other Raptors, and Great Blue Herons

Maintain the integrity of nest sites, centers of activity, or rookeries.

Control human activities, which may disturb or interfere with nesting, within one-quarter mile of active nesting areas from March 1 to August 1.

Install nesting platforms, nest boxes, and other structures to enhance habitat.

Management Actions/Direction - Roosevelt Elk

In areas with elk habitat, close and rehabilitate roads unneeded for continued resource management or use. A general target for roads open to motorized use is 1.5 miles or less per square mile. Avoid constructing roads in areas with high elk value such as breeding sites.

Through watershed analyses, address public vehicle use of elk habitat areas. The following areas will be given priority for analysis:

- Alsea Falls vicinity (700 acres)
- Bummer Ridge (2,100 acres)
- Clarence Creek area (300 acres)
- Dead Horse Canyon (1,600 acres)
- East Creek (800 acres)
- Elk Creek/Bear Creek area (2,200 acres)
- Fall Creek (2,600 acres)
- Fan Creek (1,000 acres)
- Green Peter Peninsula area (1,900 acres)
- Homestead Road area (1,700 acres)
- Little North Fork Wilson River area (500 acres)
- North Fork Siletz River area (6,400 acres)
- Skunk Creek (700 acres)
- Tillamook Ridge (700 acres)

Keep major game trails clear of slash accumulations caused by thinning projects.

Conduct forage seeding in habitat areas (200 to 500 acres per year) with appropriate seed beds and where compatible with other management objectives.

Management Actions/Direction - Golden Eagles

Protect 30 acres around known nest sites. Protection measures will include no habitat removal and no human disturbance from March 1 to August 15.

Fish Habitat Objectives

See Aquatic Conservation Strategy objectives.

Maintain or enhance the fisheries potential of streams and other waters consistent with BLM's *Fish and Wildlife 2000 Plan*, the *Bring Back the Natives* initiative, and other nationwide initiatives.

Promote the rehabilitation and protection of fish stocks at risk and their habitat.

Land Use Allocations

There are no specific land use allocations for the fisheries resource. However, Riparian Reserves, Key Watershed provisions, and Timber Production Capability Classifications will assist in meeting fish habitat management objectives.

Management Actions/Direction - Riparian Reserves

Design and implement fish habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.

Design, construct and operate fish interpretive and other use-enhancement facilities, such as trails, in a manner that does not retard or prevent attainment of Aquatic Conservation Strategy objectives. For existing fish interpretive and other user-enhancement facilities inside Riparian Reserves, ensure that Aquatic Conservation Strategy objectives are met. Where Aquatic Conservation Strategy objectives cannot be met, relocate or close such facilities.

Cooperate with federal, tribal and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish stocking, harvest and poaching that threaten the continued existence and distribution of native fish stocks inhabiting federal lands.

Cooperate with federal, tribal, and state wildlife management agencies to identify and eliminate wild ungulate impacts that are inconsistent with attainment of Aquatic Conservation Strategy objectives.

Management Actions/Direction - Late-Successional Reserves

Design projects to improve conditions for fish if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible.

Management Actions/Direction - All Land Use Allocations

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

Use the watershed analysis process to address at-risk fish species and stocks and their habitat for individual watersheds. Where appropriate, fish habitat enhancement opportunities will be identified through this process.

Coordinate with the Oregon Department of Fish and Wildlife Wild Fish Policy during planning and implementation of fish habitat enhancement projects. Priority will be given to watersheds supporting at-risk fish species and stocks and those requiring extensive restoration.

As identified through watershed analysis, rehabilitate streams and other waters to enhance natural populations of anadromous and resident fish. Rehabilitation measures may include, but not be limited to:

- fish passage improvements;
- instream structures using boulders and log placement to create spawning and rearing habitat;
- placement of fine and coarse materials for overwintering habitat; and
- riparian rehabilitation to establish or release existing coniferous trees.

Possible fish enhancement project areas include the following:

Alsea-Cove Creek
Alsea-Crooked Creek
Alsea-East Fork Lobster Creek
Alsea-Mill Creek
Alsea-North Fork Sulman Creek
Alsea-Schoolhouse Creek
Alsea-Skunk Creek
Alsea-South Fork Alsea River
Alsea-Tobe Creek
Clackamas-Deep Creek
Clackamas-Mosier Creek
Clackamas-North Fork Eagle Creek
East Fork Nehalem
Kilchis-Clear Creek
Lower Columbia-Scappoose Creek
Molalla-Camp Creek
Molalla-Canyon Creek
Molalla-Lukens Creek
Molalla-Molalla River
(lower mainstem)
Molalla-Molalla River
(above Table Rock Fork)
Molalla-Table Rock Fork
Nestucca-Bear Creek
Nestucca-Testament Creek
Sandy-Alder Creek
Sandy-Boulder Creek
Sandy-Gordon Creek
Sandy-Salmon River
(Wildwood beaver ponds)
Santiam-Crabtree Creek
Santiam-Little North Santiam River
Santiam-Sinker Creek
Siletz-Boulder Creek
Siletz-Fowler Creek/Smith Creek
Siletz-North Fork Siletz River
Siletz-Rodger Creek
Trask-Elkhorn/Cruiser Creek
Trask-Middle Fork Trask River
Trask-North Fork Trask River
Tualatin-McKay, East Fork Dairy Creeks
Wilson-Little North Fork Wilson River
Yamhill-Coast Creek
Yamhill-Willamina Creek
Yaquina-Feagles Creek

See the Special Status and SEIS Special Attention Species and Habitat section and Best Management Practices (appendix G) for additional fish habitat management actions/direction and conservation practices.

Special Status and SEIS Special Attention Species and Habitat

Objectives

See Late-Successional Reserve, Riparian Reserve, Matrix and Special Area objectives.

Protect, manage and conserve federally listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and BLM special status species policies.

Manage for the conservation of federal candidate and bureau sensitive species and their habitats so as not to contribute to the need to list and to recover the species.

Manage for the conservation of state listed species and their habitats to assist the state in achieving management objectives.

Protect and manage assessment species and their habitats where possible so as to not elevate their status to any higher level of concern.

Protect SEIS special attention species and their habitats so as not to elevate their status to any higher level of concern.

Maintain or restore community structure, species composition, and ecological processes of special status plant and animal habitat.

Land Use Allocations

All of the major land allocations in this plan are designed in part to benefit special status species in the aggregate.

Management Actions/Direction - Late-Successional Reserves

In the Northern Coast Range Adaptive Management Area, manage the following areas (mapped by the Scientific Panel on Late-Successional Forest Ecosystems) as Late-Successional Reserves:

Management Actions/Direction (continued)

- Late-Successional/Old Growth 1 and 2 areas within marbled murrelet zone 1; and
- Certain owl additions.

Design projects for recovery of threatened or endangered animal and plant species even if they result in some reduction of habitat quality for late-successional species. These projects will be designed for least impact to late-successional species.

Management Actions/Direction - All Land Use Allocations

Special Status Species

Review all proposed actions to determine whether or not special status species occupy or use affected areas or if habitat for such species is affected.

Conduct field surveys according to protocols and other established procedures. This includes surveying during the proper season unless surveys are deemed unnecessary through watershed analysis, project planning, and environmental assessment. For example, field surveys may not be conducted in all cases depending on the number and timing of previous surveys conducted, whether previous surveys looked for all species that a new survey would, and the likelihood of potential habitat. The intensity of field surveys will also vary depending on the same factors.

Consult/conference with or request technical assistance from the U.S. Fish and Wildlife Service or National Marine Fisheries Service for any proposed action which may affect federally listed or proposed species or their habitat. Based on the results of consultation/conferencing, modify, relocate, or abandon the proposed action.

Coordinate with the U.S. Fish and Wildlife Service or National Marine Fisheries Service, and other appropriate agencies and organizations and jointly endeavor to recover federally listed and proposed plant and animal species and their habitats.

Modify, relocate, or abandon a proposed action to avoid contributing to the need to list federal candidate species, state-listed species, bureau sensitive species, or their habitats.

Coordinate and cooperate with the state of Oregon to conserve state-listed species.

Identify impacts of proposed actions, if any, to bureau sensitive and assessment species and clearly describe impacts in environmental analyses. As funding permits and as species conservation dictates, bureau sensitive and assessment species will be actively managed.

Retain under federal management, or other appropriate management organization, habitat essential for the survival or recovery of listed and proposed species. Retain habitat of proposed, candidate, or bureau sensitive species where disposal would contribute to the need to list the species.

Where appropriate opportunities exist, acquire land to contribute to recovery, reduce the need to list, or enhance special status species habitat.

Coordinate with other agencies and groups in management of species across landscapes. Coordination will be accomplished through conservation plans or similar agreements which identify actions to conserve single or multiple species and/or habitats. Such strategies could preclude the need for intensive inventories or modifications to some projects where the conservation plan provides adequate protection for the species and meets the intent of policy.

Where plans exist for species no longer on the special status list, continue with the prescribed conservation actions if determined to be required to avoid relisting or future consideration for listing. In the case of interagency plans or agreements, this determination will be mutually decided. Such plans may be modified as needed based on adequacy of existing range-wide conditions and conservation management.

Where appropriate, pursue opportunities to increase the number of populations of species under BLM management through land acquisition and/or species reintroduction in coordination with other responsible agencies.

Pursue opportunities for public education about conservation of species.

Management Actions/Direction - All Land Use Allocations

SEIS Special Attention Species

Survey and Manage

Implement the survey and manage provision of the SEIS record of decision within the range of SEIS special attention species and the particular habitats that they are known to occupy. Appendix F shows which species are covered by this provision, and which of the following four categories and management actions/direction are to be applied to each:

1. Manage known sites (highest priority).
 - Acquire and manage information on known sites, make it available to all project planners, and use it to design or modify activities.
 - Protect known sites. For some species, apply specific management treatments such as prescribed fire.
 - For rare and endemic fungus species, temporarily withdraw 160 acres around known sites from ground-disturbing activities until the sites can be thoroughly surveyed and site-specific measures prescribed.
 - Establish management areas of all useable habitat up to 600 acres around two currently unprotected locations of *Oxyporous nobilissimus*. Protect these populations until the sites can be thoroughly surveyed and site-specific measures prescribed. Protection will be undertaken immediately.
2. Survey prior to management activities and manage sites.
 - Continue existing efforts to survey and manage rare and sensitive species habitat.
 - For species without survey protocols, start immediately to design protocols and implement surveys.
 - Within the known or suspected ranges and within the habitat types of vegetation communities associated with the species, survey for Larch Mountain salamanders and red tree voles.

These surveys will precede the design of all ground-disturbing activities that will be implemented in 1997 or later.

- For the other species listed in appendix F, begin development of survey protocols promptly and proceed with surveys as soon as possible. These surveys will be completed prior to ground-disturbing activities that will be implemented in fiscal year 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the SEIS.
 - Conduct surveys at a scale most appropriate to the species.
 - Develop management actions/direction to manage habitat for the species on sites where they are located.
 - Incorporate survey protocols and proposed site management in interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.
3. Conduct extensive surveys and manage sites.
 - Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement.
 - Conduct surveys according to a schedule that is most efficient and identify sites for protection at that time.
 - Design these surveys for efficiency and develop standardized protocols.
 - Begin these surveys by 1996.
 4. Conduct general regional surveys.
 - Survey to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens.
 - Initiate these surveys no later than fiscal year 1996 and complete them within ten years.

Protection Buffers

Provide protection buffers for specific rare and locally endemic species and SEIS special attention species in the upland forest matrix. (Species occurring in the district are listed below.) These species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside reserves that will be important to protect as well.

Management Actions/Direction (continued)

Apply the following management actions/direction:

- Develop survey protocols that will ensure a high likelihood of locating sites occupied by these species.
- Following development of survey protocols and prior to ground-disturbing activities, conduct surveys within the known or suspected ranges of the species and within the habitat types or vegetation communities occupied by the species. See the previous Survey and Manage section for an implementation schedule.
- Manage known habitat of special attention species requiring protection buffers as follows:

Nonvascular plants

Buxbaumia piperi

- Maintain decay class 3, 4, and 5 logs and greater than 70 percent closed-canopy forest habitats for shade.
- Restrict shelterwood and thinning prescriptions for timber harvest.

Sarcosoma mexicana

- Protect deep litter layers in older forest where found.
- Defer prescribed burning of understory or other activities which would not retain a deep litter layer.

Amphibians

Larch Mountain Salamander

- Avoid any ground-disturbing activity that would disrupt the talus layer where this species occurs.
- Maintain 40 percent canopy closure of trees within the site and within a buffer of at least the height of one site potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site.
- Consider larger buffer widths on steep slopes above protected sites.
- Conduct partial harvest if canopy closure can be retained. In such cases, logging will be conducted using helicopters or high-lead cable systems to avoid disturbance of the talus layer.
- The implementation schedule for this species is the same as for survey and manage components one and two.

Birds

Black-backed Woodpecker (high elevations in the Cascade Range)

- Avoid cutting of snags over 20 inches diameter at breast height (dbh).
- Provide for 100 percent population potential which is equivalent to 0.12 conifer snags per acre in forested habitats. Snags must be at least 17 inches dbh (or largest available if 17 inch dbh snags are unavailable) and in hard decay stages.

Great Gray Owl (high elevations in the Cascade Range)

- Provide a no-harvest buffer of 300 feet around meadows and natural openings and establish one-quarter mile protection zones around known nest sites.
- Within one year, develop and implement a standardized protocol for surveys and survey for nest locations using the protocol.
- Protect all future discovered nest sites as previously described.
- For newly discovered habitat of other special attention species requiring protection buffers, apply the management actions/direction in the SEIS record of decision.

Management Actions/Direction - All Land Use Allocations

Animals

Roosting Bats

Conduct surveys to determine the presence of roosting bats, including fringed myotis, silver-haired bats, long-eared myotis, long-legged myotis, and pallid bats. Surveys will be conducted according to protocol defined in the SEIS record of decision and in any subsequent revisions to the protocol.

As an interim measure, allow no timber harvest within 250 feet of sites containing bats. Develop mitigation measures in project or activity plans involving these sites. The intent of these measures is to protect sites from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns.

When Townsend's big-eared bats are found on federal land, notify the Oregon Department of Fish and Wildlife. Develop management prescriptions for these sites that include special consideration for potential impacts on this species.

Listed and Proposed Threatened and Endangered Species

General

Implement the land use allocations and management actions/direction of this proposed resource management plan which are designed to enhance and maintain habitat for threatened and endangered species.

Northern Spotted Owl (federal threatened species)

In the Matrix and the Northern Coast Range Adaptive Management Area, retain 100 acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center for all known (as of January 1, 1994) spotted owl activity centers.

Fall no trees within one-quarter mile of all active northern spotted owl nest sites from approximately March 1 to September 30 to avoid disturbance and harm to young owls.

With minor exceptions, restrict human activities that could disturb owl nesting, especially use of large power equipment, within one-quarter mile of all active spotted owl nest sites from approximately March 1 to September 30. Restrictions on activities will usually not be required for owl nests and activity centers located near roads or in other areas of permanent human activity.

Marbled Murrelet (federal threatened species)

Conduct two years of survey prior to any human disturbance of marbled murrelet habitat.

Protect contiguous existing and recruitment habitat for marbled murrelets (i.e., stands that are capable of becoming marbled murrelet habitat within 25 years) within a one-half mile radius of any site where the birds' behavior indicates occupation (e.g., active nest, fecal ring or eggshell fragments, and birds flying below, through, into, or out of the forest canopy within or adjacent to a stand).

Neither conduct nor allow harvest of timber within occupied marbled murrelet habitat at least until completion of the Marbled Murrelet Recovery Plan.

During silvicultural treatments of nonhabitat within the one-half mile circle, protect or enhance suitable or replacement habitat.

Amend or revise management direction as appropriate when the recovery plan is completed.

Bald Eagle (federal threatened species)

Comply with the *Pacific Bald Eagle Recovery Plan* (U.S. Department of the Interior, Fish and Wildlife Service 1986), the working implementation plan (Washington Department of Wildlife 1989), and existing site-specific habitat management plans.

Protect the following known and potential nest sites and communal roosting areas identified in the bald eagle recovery implementation plan: Elk Creek, Green Peter Peninsula, Kilchis River, North Santiam, North Fork Siletz River, Raymond Creek, Table Mountain, and Wilson River.

Write and implement habitat management plans incorporating the BLM-responsible actions identified in the bald eagle recovery implementation plan.

Review habitat management plans periodically to determine whether modifications are needed.

Peregrine Falcon (federal endangered species)

Comply with the *Pacific Coast Recovery Plan for the American Peregrine Falcon* (U.S. Department of the Interior, Fish and Wildlife Service 1982).

Oregon Chub (endangered species)

Participate in recovery efforts for the Oregon chub. If populations are found in streams administered by BLM, management actions/direction will be developed at that time under the recovery plan.

Management Actions/Direction (continued)

Management Actions/Direction - All Land Use Allocations

Plants

Listed and Proposed Threatened and Endangered Species

General

Implement the land use allocations and management actions/direction of this proposed resource management plan which are designed to enhance and maintain habitat for all endangered and threatened species.

Nelson's Checkermallow (federal threatened species)

Pending completion of a recovery plan, manage the species as follows:

- Continue special management of the proposed Walker Creek Area of Critical Environmental Concern and the seedling transplant sites at South McGuire and Neverstill. This includes all the Nelson's checkermallow populations on BLM-administered lands.
- Study and monitor population dynamics of the plant in its native prairie habitat.

Comply with the recovery plan for the species when it is completed.

Special Areas

Objectives

Retain existing research natural areas and existing areas of critical environmental concern that meet the test of continuing need for designation. Retain other special areas. Provide new special areas where needed to maintain or protect important values.

Maintain, protect, or restore relevant and important value(s) of areas of critical environmental concern.

Preserve, protect, or restore native species composition and ecological processes of biological communities (including Oregon Natural Heritage Plan terrestri-

al and aquatic cells) in research natural areas. These areas will be available for short- or long-term scientific study, research and education and will serve as a baseline against which human impacts on natural systems can be measured.

Provide for recreation uses and environmental education in outstanding natural areas. Manage uses to prevent loss of outstanding values.

Provide and maintain education opportunities in environmental education areas. Control uses to minimize disturbance of educational values.

Land Use Allocations

Special Area Category	Number	Approx. Acres
Areas of Critical Environmental Concern ¹	13	4,000
Areas of Critical Environmental Concern/ Research Natural Areas	8	3,500
Areas of Critical Environmental Concern/ Outstanding Natural Areas	6	1,100
Environmental Education Areas	1	200
Other (Willamette River parcels and A.J. Dwyer Scenic Area)	2	80

¹ This category includes only areas with an area of critical environmental concern designation. Double designated areas, such as areas of critical environmental concern/research natural areas, are not included.

See map 2-3 for locations and table 2-2 for site-specific acres.

Management Actions/Direction

Except for the Big Canyon Area of Critical Environmental Concern, manage previously designated special areas in accordance with approved management plans. (Big Canyon will be managed as a Late-Successional Reserve.) If management plans have not been prepared for previously designated areas, manage in accordance with the guidelines in table 2-2.

Table 2-2 Management of Proposed Special Areas

Name	Acres	Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/Salable Mineral Entry	Timber Harvest
A.J. Dwyer Scenic Area	5	Limited	Open - NSO	Closed	No
Carolyn's Crown ACEC / RNA	261	Closed	Open - NSO	Closed	No
Crabtree/Shafter Creek ACEC / RNA / ONA	961	Limited	Open - NSO	Closed	No
Elk Creek ACEC	1,577	Closed	Open - NSO	Closed	No-Primary Zone Yes-Secondary Zone ¹
Forest Peak ACEC / RNA	134	Closed	Open - NSO	Closed	No
Grass Mtn. ACEC / RNA	726	Closed	Open - NSO	Closed	No
High Pk.-Moon Cr. ACEC / RNA	1,538	Closed	Open - NSO	Closed	No
Larch Mtn. Env. Ed. Site	183	Closed	Open - NSO	Closed	No
Little Grass Mtn. ACEC / ONA	45	Closed	Open - NSO	Closed	No
Little Sink ACEC / RNA	81	Closed	Open - NSO	Closed	No
Lost Prairie ACEC	58	Closed	Open - NSO	Closed	No
Marys Peak ACEC / ONA	104	Limited	Open - NSO	Closed	No
Middle Santiam Terrace ACEC	108	Closed	Open - NSO	Closed	No
Nestucca River ACEC	1,062	Limited	Open - NSO	Closed	No
North Santiam ACEC	31	Closed	Open - NSO	Closed	No
Rickreall Ridge ACEC	177	Closed	Open - NSO	Closed	No

Table 2-2 Management of Proposed Special Areas (continued)

Name	Acres	Off-Highway Vehicle Designation	Leasable Mineral Entry	Locatable/Salable Mineral Entry	Timber Harvest
Saddleback Mtn. ACEC / RNA	151	Closed	Open - NSO	Closed	No
Sandy River Gorge ACEC / ONA	400	Closed	Open - NSO	Closed	No
Sheridan Peak ACEC	299	Closed	Open - NSO	Open - AR	Yes ¹
Soosap Meadows ACEC	343	Closed	Open - NSO	Closed	No
The Butte ACEC / RNA	40	Closed	Open - NSO	Closed	No
Valley-of-the-Giants ACEC / ONA	51	Closed	N / A ²	N / A ²	No
Walker Flat ACEC	10	Limited	Open - NSO	Closed	No
White Rock Fen ACEC	51	Closed	Open - NSO	Closed	No
Wilhoit Springs ACEC	170	Limited	Open - NSO	Closed	No
Willamette River Parcels	76	Closed	Open - NSO	Closed	No Commercial Timber
Williams Lake ACEC	98	Limited	Open - NSO	Closed	No
Yampo ACEC	13	Limited	Open - NSO	Closed	No
Yaquina Head ACEC / ONA	106	Limited	Open - NSO	Closed	No Commercial Timber

¹ Thinning in timber up to 110 years old.² Mineral resources not federally administered.

ACEC = Area of Critical Environmental Concern

RNA = Research Natural Area

ONA = Outstanding Natural Area

NSO = No Surface Occupancy

AR = Additional restrictions

N / A = Not applicable

Management Actions/Direction (continued)

Develop site-specific management plans for new special areas as needed. Protect resource values in new areas pending completion of management plans. See table 2-2 for management guidelines. Management plans will address other possible actions such as land acquisition, use of prescribed fire, and interpretation.

Apply the guidelines of the prevailing land use allocation(s) to candidate areas of critical environmental concern that were dropped from further consideration. See appendix H for a list of these areas and the land use allocations under which they will be managed.

Cultural Resources Including American Indian Values

Objectives

Identify cultural resource localities and manage them for public, scientific, and cultural heritage purposes.

Conserve and protect designated cultural resources for future generations.

Support ecosystem management by providing information on long-term environmental change and the interactions between humans and the environment in the past.

Fulfill responsibilities to American Indian groups regarding heritage and religious concerns.

Land Use Allocations

Sites with significant values will be protected to the extent possible from vandalism and management actions that would degrade these values. Cultural resource sites are not mapped in this plan or described in detail due to the sensitivity of resource values.

The Salem District manages nine cultural resource sites listed or eligible for listing in the National Register of Historic Places.

Management Actions/Direction

Evaluate cultural resource sites to determine their potential for contributing to public, cultural heritage, and/or scientific purposes.

Investigate landscape features such as bogs, ponds, and packrat middens, and cultural sites that contain information regarding long-term environmental change.

Develop methods for describing past landscapes and the role of humans in shaping those landscapes.

Address the management of cultural resources in watershed analyses and project plans.

Develop educational and interpretive programs to increase public awareness and appreciation of cultural resources and the nation's past, as part of the "Adventures in the Past" initiative.

Work with local American Indian groups and other interested parties to develop partnerships to accomplish cultural resource objectives.

Take appropriate law enforcement or other actions when necessary to protect cultural resources. (Such actions may include physical protection measures such as rripping and barrier installations to reduce deterioration.)

Work with federally recognized Indian tribes and other Indian groups to develop memoranda of understanding so that their heritage and religious concerns may be appropriately considered. These groups include the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz Indians, and the Confederated Tribes of Warm Springs.

Consider acquiring significant cultural resource properties for public, cultural heritage, and scientific purposes.

Visual Resources

Objectives

Manage all BLM-administered lands to meet the following visual resource quality objectives:

- VRM Class I areas - preserve the existing character of landscapes.
- VRM Class II areas - retain the existing character of landscapes.
- VRM Class III areas - partially retain the existing character of landscapes.
- VRM Class IV areas - allow major modifications of existing character of landscapes.

Emphasize management of scenic resources in selected high-use areas to retain or preserve scenic quality.

Land Use Allocations

VRM Class	Approx. BLM Acres
I	14,100
II	22,800
III	59,600
IV	301,600

See map 2-4 for the location of visual resource management classes.

Management Actions/Direction

Address visual resource management issues when preparing watershed analyses.

Use the visual resource contrast rating system during project-level planning to determine whether or not proposed activities will meet visual resource management objectives. Use mitigation measures to reduce visual contrasts.

Provide for natural ecological changes in visual resource management class I areas. Some very limited management activities may occur in these areas. The level of change to the characteristic landscape should be very low and will not attract attention. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage visual resource management class II lands for low levels of change to the characteristic landscape. Management activities may be seen but should not attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage visual resource management class III lands for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Manage visual resource management class IV lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture.

Wild and Scenic Rivers

Objectives

Manage designated segments of the National Wild and Scenic Rivers System by protecting their outstandingly remarkable values, and maintain and enhance the natural integrity of river-related values.

Find important and manageable river segments suitable for designation where such designation will contribute to the National Wild and Scenic Rivers System.

Protect outstandingly remarkable values identified on BLM-administered lands within the study corridors of eligible river segments studied and found suitable for inclusion as components of the National Wild and Scenic Rivers System.

Provide interim protective management for outstandingly remarkable values identified on BLM-administered lands along river segments determined eligible but not studied for inclusion as components of the National Wild and Scenic Rivers System.

Manage the natural integrity of river-related values to maintain or enhance the highest tentative classification determined for rivers found eligible or studied for suitability.

Land Use Allocations

Designated River Segments

River Segment	Classification (for BLM segment)	Miles	Approx. BLM Acres
Clackamas River	Recreational	27.0	200
Quartzville Creek	Recreational	9.7	1,600
Salmon River	Recreational Scenic	6.7 11.8	500 (for both segments)
Sandy River	Recreational Scenic	16.6 3.8	500 (for both segments)

River Segments Found Suitable for Inclusion in the National System

River Segment	Tentative Classification	Miles	Approx. BLM Acres	Percent BLM
Nestucca River (segment A)	Recreational	15.3	3,000	72
Molalla River (segment B)	Recreational	12.4	3,300	84

The corridor width for rivers found eligible or studied for suitability is generally defined as one-quarter mile on either side of the river (approximately one-half mile wide corridor). Technically these are not land use allocations at this time. If Congress passes legislation to designate them, they will be automatically added to the allocations of the resource management plan.

See map 2-5 for segment locations. Assessments for river segments found suitable for inclusion in the national system are located in appendix I.

Management Actions/Direction

See appendix J for general management guidelines for wild and scenic rivers.

Revise the Salmon River, Sandy River, and Quartzville Creek Wild and Scenic River management plans to address attainment of Aquatic Conservation Strategy objectives. Manage these river segments according to the revised management plans.

Provide the following types of interim protection on river segments found eligible or suitable for inclusion as components of the National Wild and Scenic Rivers System:

- Eligible and/or suitable recreational rivers: exclude timber harvest in the Riparian Reserves, moderately restrict development of leasable and salable minerals, and protect a segment's free-flowing values and identified outstandingly remarkable values.
- Eligible and/or suitable scenic rivers: exclude timber harvest in the Riparian Reserves, provide visual resource management class II management in the one-half mile wide corridor, and protect a segment's free-flowing values and identified outstandingly remarkable values.
- Eligible and/or suitable wild rivers: exclude timber harvest and other disturbing activities within the one-half mile wide corridor.
- Upon completion of the record of decision for this proposed resource management plan, release from interim protection all river segments found not suitable for inclusion as components of the national system.

Prepare a suitability study report for Elkhorn Creek. This will be done jointly with the Willamette National Forest. In the draft resource management plan, BLM found this stream not suitable for designation as a component of the national system. Based on subsequent public comment and recent Forest Service interest in studying Elkhorn Creek, the BLM will set aside the original suitability finding.

Wilderness

Objectives

Manage use of resources within Table Rock Wilderness to preserve the undisturbed natural integrity of the area.

Maintain the wilderness character of Little Sink Instant Study Area to comply with BLM's Wilderness Interim Management Policy.

Land Use Allocations

Area Name	Wilderness Status	Approx. BLM Acres
Table Rock Wilderness	Designated Proposed Addition	5,800 350
Little Sink	Instant Study Area	80

See map 2-5 for the location of these areas.

Management Actions/Direction

Revise the Table Rock Wilderness management plan to address attainment of Aquatic Conservation Strategy objectives. Manage the wilderness in accordance with the revised plan.

Recommend to Congress that 350 acres of BLM-administered lands contiguous to the existing Table Rock Wilderness be designated a part of the wilderness to create a more logical and manageable boundary.

Complete rehabilitation projects within the proposed Table Rock Wilderness addition to restore native vegetation and create more natural appearing landscapes.

Follow interim management guidelines for the Little Sink Instant Study Area until a decision is made by Congress. Authorize no action that would diminish the suitability of the area as wilderness. Take appropriate actions following congressional decision.

Rural Interface Areas

Objectives

Consider the interests of adjacent and nearby rural land owners, including residents, during analysis, planning and monitoring related to managed rural interface areas. These interests include personal health and safety, improvements to property, and quality of life. Determine how land owners might be or are affected by activities on BLM-administered lands.

Land Use Allocations

Mapped rural interface areas encompass approximately 36,380 acres of BLM-administered lands within one-half mile of private lands zoned for 1 to 20 acre lots (see map 2-6 for locations and table 2-3 for acres by township and range). Areas zoned for 40-acre and larger lots with homes adjacent to or near BLM-administered lands are also considered rural interface areas. They are not mapped in the Western Oregon Digital Data Base.

Management Actions/Direction

Work with local governments to:

- improve the BLM data base regarding private land planning/zoning designations and residential development near BLM-administered lands;
- provide information to local planners regarding BLM land allocations in rural interface areas and the management objectives and guidelines for these lands;
- develop design features and mitigation measures that will minimize the possibility of conflicts between private and federal land management; and
- monitor the effectiveness of design features and mitigation measures in rural interface areas.

As a part of watershed analysis and project planning, work with local individuals and groups, including fire protection districts, to identify and address concerns related to possible impacts of proposed management activities on rural interface areas.

Use design features and mitigation measures to avoid or minimize impacts to health, life and property, and quality of life. Examples include different harvest regimes, hand application rather than aerial applica-

Table 2-3 Managed Rural Interface Areas

Rural Interface Area			Rural Interface Area		
Interface Area		BLM Acres	Interface Area		BLM Acres
T.2 N.	R. 2 W.	312	T. 5 S.	R. 2 E.	33
T.3 N.	R. 2 W.	297	T. 5 S.	R. 3 E.	53
T.4 N.	R. 2 W.	79	T. 5 S.	R. 6 W.	32
T.4 N.	R. 3 W.	100	T. 5 S.	R. 7 W.	818
T.1 S.	R. 4 E.	247	T. 6 S.	R. 1 E.	153
T.1 S.	R. 5 E.	101	T. 6 S.	R. 2 E.	1,109
T.1 S.	R. 4 W.	8	T. 6 S.	R. 7 W.	175
T.1 S.	R. 5 W.	108	T. 6 S.	R. 10 W.	2
T.1 S.	R. 7 W.	35	T. 8 S.	R. 4 E.	3
T.1 S.	R. 8 W.	785	T. 9 S.	R. 1 E.	32
T.1 S.	R. 9 W.	129	T. 9 S.	R. 2 E.	642
T.2 S.	R. 4 E.	303	T. 9 S.	R. 3 E.	558
T.2 S.	R. 5 E.	168	T. 9 S.	R. 10 W.	16
T.2 S.	R. 6 E.	998	T. 9 S.	R. 11 W.	39
T.2 S.	R. 7 E.	5	T. 10 S.	R. 1 E.	1,227
T.2 S.	R. 3 W.	80	T. 10 S.	R. 2 E.	337
T.2 S.	R. 5 W.	260	T. 10 S.	R. 3 E.	128
T.3 S.	R. 3 E.	898	T. 10 S.	R. 1 W.	193
T.3 S.	R. 4 E.	74	T. 10 S.	R. 10 W.	19
T.3 S.	R. 5 E.	34	T. 11 S.	R. 1 E.	507
T.3 S.	R. 5 W.	597	T. 12 S.	R. 1 E.	75
T.3 S.	R. 8 W.	25	T. 13 S.	R. 7 W.	894
T.3 S.	R. 9 W.	159	T. 13 S.	R. 11 W.	30
T.4 S.	R. 2 E.	162	T. 14 S.	R. 7 W.	474
T.4 S.	R. 3 E.	454	T. 14 S.	R. 8 W.	1,810
T.4 S.	R. 4 E.	160	T. 14 S.	R. 9 W.	238
T.4 S.	R. 5 W.	120	T. 15 S.	R. 8 W.	935
T.4 S.	R. 6 W.	187	T. 15 S.	R. 9 W.	76
Total acres					17,491

Source: Western Oregon Digital Data Base.

Management Actions/Direction (continued)

tion of herbicides and pesticides, and hand piling of slash for burning rather than broadcast burning. Monitor the effectiveness of design features and mitigation measures.

Eliminate or mitigate public hazards such as abandoned rock quarries.

Where needed, reduce public use of nonthrough or local roads within rural interface areas and within one-quarter mile of existing dwellings. Gates and other types of traffic barriers such as guardrails, berms, ditches, and log barricades will be used as appropriate. These actions are needed to reduce unauthorized dumping, fire risk, and vandalism to private property.

Where needed, use dust abatement measures on roads during BLM timber harvest operations or other BLM commodity hauling. Encourage and enforce dust abatement measures when haulers use BLM roads under permits and right-of-way agreements.

Where needed, reduce fuel hazards on BLM-administered lands in rural interface areas.

Socioeconomic Conditions

Objectives

Contribute to local, state, national and international economies through sustainable use of BLM-managed lands and resources and use of innovative contracting and other implementation strategies.

Provide amenities (e.g., recreation facilities, protected special areas and high quality fisheries) that enhance communities as places to live and work.

Land Use Allocations

There are no specific land use allocations related to socioeconomic conditions. However, allocations such as the general forest management area and adaptive management area can assist in meeting socioeconomic objectives.

Management Actions/Direction

Support and assist the state of Oregon Economic Development Department's efforts to help rural, resource-based communities develop and implement alternative economic strategies as a partial substitute for declining timber-based economies. Support and assistance could include:

- increased coordination with state and local governments and citizens to prioritize BLM management and development activities;
- increased emphasis on management of special forest products; and
- recreation development and other activities identified by BLM and the involved communities as benefiting identified economic strategies.

Improve wildlife and fish habitat to enhance hunting and fishing opportunities and to increase the economic returns generated by these activities.

Improve viewing opportunities for watchable wildlife at Yaquina Head Outstanding Natural Area, the Nestucca River, and Green Peter Reservoir.

Plan and design forest management activities to produce a sustained yield of products to support local and regional economic activity. A diversity of forest products (timber and nontimber) will be offered to support large and small commercial operations and provide for personal use.

Recreation

Objectives

Provide a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area.

Manage scenic, natural, and cultural resources to enhance visitor recreation experiences and produce satisfied public land users.

Support locally-sponsored tourism initiatives and community economic strategies by providing recreation projects and programs with both short- and long-term benefits.

Manage off-highway vehicle use on BLM-administered lands to protect natural resources, promote visitor safety, and minimize conflicts among various users.

Enhance recreation opportunities provided by existing and proposed watchable wildlife areas and national back country byways.

Continue to provide nonmotorized recreation opportunities (hiking, biking, etc.) and create additional opportunities where consistent with other management objectives.

Manage special and extensive recreation management areas in a manner consistent with *BLM Recreation 2000: A Strategic Plan* (U.S. Department of the Interior, BLM, WO 1989b) and Oregon-Washington public lands recreation initiative (U.S. Department of the Interior, BLM, OSO 1989b).

Land Use Allocations

Recreation Management Category	Number	Approx. BLM Acres	Approx. BLM Miles
Recreation Sites			
Existing	12	800	
Proposed	10	300	
Recreation Trails			
Existing	8		47
Proposed	11		131
Special Recreation Management Areas			
Existing	4	1,800 ¹	
Proposed	7	70,800	
Extensive Recreation Management Areas			
Existing	5	321,300	
Proposed	0		
Off-Highway Vehicle Use Areas			
Open	--	129,900	
Limited	--	229,200	
Closed	--	39,000	
Back Country Byways			
Existing	2		22
Proposed	1		15

¹ Special recreation management area boundary reduced to coincide with the special area boundary.

See map 2-7 for locations and the following management actions/direction section for lists of existing and proposed recreation sites, areas, trails, and back country byways. Areas designated for off-highway vehicle use are not mapped in this proposed resource management plan. They will be mapped in subsequent planning documents.

Management Actions/Direction - Riparian Reserves

Design new recreational facilities within Riparian Reserves, including trails and dispersed sites, so as not to prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impacts to ensure that they do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives.

Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective, eliminate the practice or occupancy.

Management Actions/Direction - Late-Successional Reserves

Retain and maintain existing recreation developments consistent with other management actions/direction for Late-Successional Reserves.

Use adjustment measures, such as education, use limitations, traffic control devices, or increased maintenance, when dispersed or developed recreation practices retard or prevent attainment of Late-Successional Reserve objectives.

Neither construct nor authorize new facilities that may adversely affect Late-Successional Reserves.

Review on a case-by-case basis new recreation development proposals. They may be approved when adverse effects can be minimized and mitigated.

Management Actions/Direction (continued)

Locate new recreation developments to avoid degradation of habitat and adverse effects on identified late-successional species.

Remove hazard trees along trails and in developed recreation areas.

Management Actions/Direction - All Land Use Allocations

General

Enhance travel and recreation management through increased emphasis on interpretive and informational signs and maps. Identify on informational handouts at field locations all major travel routes within the planning area. Prepare a travel map for public distribution. These actions will support state and local strategies to encourage tourism.

Manage recreation areas to minimize disturbance to a number of fungus and lichen species known to occur within these areas. Follow survey and manage actions/direction as stated in the introduction to Land Use Allocations and Resource Programs.

In addition to the guidelines for Late-Successional Reserves and Riparian Reserves, manage recreation resources in accordance with the following guidelines:

Developed Recreation Sites and Trails

Continue to operate and maintain 12 developed recreation sites and 8 developed trails. These sites and trails are:

Sites	Trails
Alder Glen	Baty Butte/Silver King
Alsea Falls	Boulder Ridge
Canyon Creek	Eagle Creek
Dogwood	McIntyre Ridge
Dovre	Nasty Rock
Elk Bend	Table Rock
Elkhorn Valley	Tillamook Off-Highway Vehicle
Fan Creek	Valley-of-the-Giants
Fishermen's Bend	
Missouri Bend	
Wildwood	
Yellowbottom	

Designate developed recreation sites as fire suppression areas and fire fuels management areas. These designations will reduce fire hazards and protect investments. Restrictions on fire suppression equipment and activities will be required in some sites.

Manage timber within developed recreation sites for purposes of removing hazard trees, providing space for additional facilities and activity areas, and providing desired regeneration of the forest canopy.

Pursue mineral withdrawals for developed recreation sites.

Implement no action that will affect developed sites/ areas which are under existing Recreation and Public Purposes Act leases to other agencies. When existing leases for these sites/areas expire, reevaluate their relevance, on a case-by-case basis, in light of current BLM management objectives.

Proposed Recreation Sites and Trails

Within the guidelines of watershed analyses and as funding becomes available, develop 10 proposed recreation sites and 11 proposed recreation trails. These sites and trails, grouped into high and moderate development priority categories, are:

Recreation Sites

High Development Priority

Alder Glen Expansion (Tillamook County) ¹
Mill Creek
Miner's Meadow (Linn County) ¹
Molalla River
Parker Creek

Moderate Development Priority

Bear Creek (Tillamook County) ¹
Dick's Ridge (Benton County) ¹
Quartzville Creek
Table Rock Wilderness Trailheads
Valley-of-the-Giants Trailhead

Recreation Trails

High Development Priority

Corvallis-to-the-Sea
Crabtree Mountain

[Note: named Green Peter Peninsula-Crabtree Lake trail in draft resource management plan]

Marys Peak
Nestucca River
Tillamook Off-Highway Vehicle Additions
(Tillamook County) ¹

¹ Added between draft and proposed resource management plans.

Moderate Development Priority

Elk Creek (Tillamook County) ¹
 Elkhorn Creek
 Harry Mountain (Linn County) ¹
 Little North Fork Wilson (Tillamook County) ¹
 North Fork Alsea River
 South Fork Alsea River

¹ Added between draft and proposed resource management plans.

To retain options for future development, harvest no timber in the proposed recreation sites. Exceptions may be made where a natural catastrophe (e.g., fire or windstorm) destroys the recreation development potential of the sites or trail locations. In these circumstances, salvage of dead and dying trees or removal of hazard trees may be undertaken. Trees will be removed during construction of facilities.

Pursue mineral withdrawals for proposed recreation sites when development is approved.

Special Recreation Management Areas

Through watershed analyses, address special recreation management area issues, and prioritize projects.

Prepare project plans as needed.

Within the guidelines of watershed analyses, designate and manage four existing and seven new special recreation management areas:

Existing Special Recreation Management Areas

Fishermen's Bend	Sandy River
Nestucca River	Yaquina Head

Proposed Special Recreation Management Areas

Little North Santiam River	Mt. Hood Corridor
Marys Peak	North Fork Siletz River
Mill Creek	Yellowstone
Molalla River/Table Rock	

Extensive Recreation Management Areas

Through watershed analyses, address extensive recreation management area issues, and prioritize projects. Prepare project plans as needed.

Back Country Byways

Continue to facilitate, manage, and promote public use of the Nestucca River and South Fork Alsea River National Back Country Byways.

Designate Quartzville Road as a new component of the National Back Country Byway system. This effort will be coordinated with Linn County, the Forest Service, and the Army Corps of Engineers.

Extend the Nestucca River Back Country Byway to include additional road miles of significance. This effort will be coordinated with Tillamook and Yamhill counties and adjacent landowners.

Off-Highway Vehicle Areas

Designate the majority of BLM-administered lands available to off-highway vehicle use. Areas to be closed or limited are outlined on the following page.

Enhance off-highway vehicle use of the following areas:

Bald Mtn./Nestucca
 Greasy Creek/Gleason Creek
 Lacombe/Green Mtn.
 Rye Mtn./Grassy Flat
 Trask Mtn./North Yamhill River

Some possible enhancement measures include better signing; construction of parking areas with off-loading ramps and restrooms; placement of stream crossing structures; etc. Specific enhancement measures will be addressed in watershed analyses and subsequent project plans.

Off-Highway Vehicle Use Designation Categories

Site/Area Category	Designation Categories ¹			
	Closed	Seasonal	Limited	
			Existing Roads and Trails ²	Designated Roads and Trails
Wilderness/Wilderness Study Areas	X			
Special Areas	X			X
Wild and Scenic River Segments				
Designated	X		X	X
Eligible But Not Studied	X		X	X
Suitable				X
Developed Recreation Sites				X
Developed Recreation Trails	X			X
Special Recreation Management Areas	X			X
Recreation and Public Purposes Act Leases	X		X	X
Special Status Species Habitat				X
Elk Emphasis Areas	X	X		X
Riparian Reserves			X	
Progeny Test Sites	X			

¹ Site-specific resource values require varying degrees of protection; therefore, use restrictions within a particular category range from closed to limited.

² Some may be closed if continued use prevents or retards attainment of Aquatic Conservation Strategy objectives.

Source: Salem District recreation inventory records.

Timber Resources

Objectives

Provide a sustainable supply of timber and other forest products.

Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest.

Manage timber stands to reduce the risk of loss from fires, animals, insects, and diseases.

Provide for salvage harvest of timber killed or damaged by events such as wildfire, windstorms, insects, or disease, consistent with management objectives for other resources.

Land Use Allocations

Lands available for scheduled timber harvest are as follows:

Land Use Allocation	Approx. BLM Acres
Matrix	
General Forest Management Area (including visual resource management class II, rural interface, and timber production capability classification restricted)	40,600
Connectivity/Diversity Blocks	10,700
Adaptive Management Area	10,200

Management Actions/Direction - Matrix

(General Forest Management Area and Connectivity/Diversity Blocks)

General

See appendix K for a description of silvicultural practices and harvest methods.

Conduct timber harvest so as to:

- Leave 240 linear feet of logs per acre greater than or equal to 20 inches in diameter. Logs less than 20 feet in length will not be credited toward this total. Existing decay class 1 and 2 logs count toward this requirement. Down logs will reflect the

species mix of original stands. Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.

- Retain snags within timber harvest units at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels. Meet the 40 percent minimum throughout the Matrix with per acre requirements met on areas averaging no larger than 40 acres.

Maintain a well distributed pattern of early, mid- and late-successional forest across the Matrix.

Apply silvicultural systems that are planned to produce, over time, forests which have desired species composition, structural characteristics, and distribution of seral or age classes.

Within the framework of watershed analyses, develop plans for the locations and specific designs of timber harvests and other silvicultural treatments.

Base silvicultural treatments and harvest designs on the functional characteristics of the ecosystem and on the characteristics of each forest stand and site. Treatments will be designed, as much as possible, to prevent the development of undesirable species composition, species dominance, or other stand characteristics. The principles of integrated pest management and integrated vegetation management will be employed to avoid the need for direct treatments. Herbicides will be used only as a last resort to achieve management objectives.

Keep new road construction to the minimum needed for access to planned harvest units or for management of other resources.

Timber Harvest and Site Preparation

Determine the probable level of harvest based on the productivity of lands available for timber production and on the silvicultural treatments planned for these lands.

Plan harvest of marketable hardwood stands in the same manner as conifer stands, if the land is not otherwise constrained from timber management. Volume from projected hardwood harvest will be included in the probable sale quantity estimate.

Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives.

Management Actions/Direction (continued)

Apply site preparation treatments as needed following timber harvest.

Planting

Ensure that harvested areas are reforested as quickly as possible. Supplement natural seeding with artificial seeding or planting of nursery-grown seedlings.

Use tree seed collected within the same seed zone and elevation band as the specific project areas. Use genetically selected seed when available (see Forest Genetics Program, appendix L).

When possible, complete reforestation within one year of harvest and site preparation, using tree species indigenous to the site.

Plant a mixture of species to ensure diversity of the new stand. Suitable species for the planning area include Douglas-fir, western hemlock, western redcedar, noble fir, western white pine, sugar pine, grand fir, and red alder.

Plant identified root disease centers with tree species resistant to the disease.

Conduct post-treatment reforestation surveys to determine the rate of seedling survival and to identify what areas should be replanted or interplanted to meet prescribed stocking levels.

Plantation Protection, Maintenance and Release

Protect tree plantations from animal damage with the following treatments, where appropriate:

- Place plastic tubing or netting over the seedlings; or put bud caps over the growing tips to reduce animal browsing or clipping damage.
- Trap mountain beavers and gophers when they threaten the survival of a plantation.
- Establish seasonal bear feeding stations at selected locations, set special hunting seasons, and on rare occasions, snare and destroy selected animals to reduce black bear damage.

Use maintenance and release treatments to manage competing vegetation in young plantations. Determine annually the number of acres requiring each of these treatments in conjunction with normal reforestation surveys.

Analyze clearcuts created by past management for stand maintenance needs. This will occur during a transition period of 15 to 20 years.

Intensive Practices

Consider precommercial thinning of stands between 10 and 15 years old that average over 450 trees per acre. Thin to an average spacing of 12 to 16 feet. The number of trees left may vary from 170 to 300 per acre.

Consider fertilization of stands in the General Forest Management Area that have been precommercially or commercially thinned or where stand age and density are in the desired range.

Apply pruning to selected young forest stands. Prune the lower branches of the identified crop trees to a height of approximately 18 feet.

Commercially thin managed timber stands to increase timber production or to achieve other management objectives. Thin only in suitable stands where topography and road access are favorable for partial cut logging, or use aerial yarding methods.

Convert to appropriate conifer species lands where hardwood trees or brush became established following harvest of conifers.

Manage hardwood stands on sites not suitable for conifer production.

Management Actions/Direction - General Forest Management Area

Schedule regeneration harvests to assure that, over time, harvest will occur in stands at or above the age which produces maximum average annual growth over the lifetime of a timber stand. In the planning area, this culmination occurs between approximately 70 and 110 years of age. During the first decade, regeneration harvests may be scheduled in stands as young as 60 years, in order to develop a desired age class distribution across the landscape.

Retain late-successional forest patches in landscape areas where little late-successional forest persists. This management action/direction will be applied in fifth field watersheds (20 to 200 square miles) in which federal forest lands are currently comprised of 15 percent or less late-successional forest. (The

assessment of 15 percent will include all federal land allocations in a watershed.) Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of a watershed have recovered to the point where they could replace the ecological roles of these stands.

Retain 6 to 8 green conifer trees per acre after regeneration harvest to provide a source of snag recruitment and a legacy bridging past and future forests. Retained trees will be distributed in variable patterns (e.g., single trees, clumps and strips) to contribute to stand diversity.

In addition to the previous green tree retention management action/direction, retain green trees for snag recruitment in harvest units where there is an identified, near-term (less than three decades) snag deficit. These trees do not count toward green-tree retention requirements.

Management Actions/Direction - Connectivity/Diversity Blocks

Maintain 25 to 30 percent of each block in late-successional forest at any point in time. The percentage of habitat will include habitat in other allocations, such as Riparian Reserves. Blocks may be comprised of contiguous or noncontiguous BLM-administered lands. The size and arrangement of habitat within a block should provide effective habitat to the extent possible.

Schedule regeneration harvests on a 150-year area control rotation.

Retain 12 to 18 green conifer trees per acre when an area is regeneration harvested. Distribute the retained trees in variable patterns (e.g., single trees, clumps and strips) to contribute to stand diversity. The management goal for the retained trees and subsequent density management is recovery of old-growth conditions in approximately 100 to 120 years.

Special Forest Products

Objectives

Manage for the production and sale of special forest products when demand is present and where actions taken are consistent with primary objectives for the land use allocation.

Use the principles of ecosystem management to guide the management and harvest of special forest products.

Land Use Allocations

No land use allocations are made specifically for special forest products.

Management Actions/Direction - Riparian Reserves

Where catastrophic events result in degraded riparian conditions, allow fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.

Management Actions/Direction - Late-Successional Reserves

Permit fuelwood gathering only in existing cull decks, in areas where green trees are marked by silviculturists for thinning, in areas where blowdown is blocking roads, and in recently harvested timber sale units where down material will impede scheduled post-sale activities or pose an unacceptable risk of future large scale disturbance. In all cases, these activities will comply with management actions/direction for Late-Successional Reserves.

Evaluate whether special forest product harvest activities have adverse effects on Late-Successional Reserve objectives.

Prior to selling special forest products, ensure resource sustainability and protection of other resource values such as special status plants or animal species.

Management Actions/Direction (continued)

Where special forest product activities are extensive, evaluate whether they have significant effects on late-successional habitat. Restrictions may be appropriate in some cases.

Management Actions/Direction - All Land Use Allocations

Allow harvest of special forest products throughout the district but apply the following area and plant species/group restrictions:

("X"s in both columns of the following chart means that harvesting in some sites/areas will be limited to seasons, amounts, etc., and harvesting in other sites/areas will not be allowed.)

Area	Limited Harvest	No Harvest
Areas of Critical Environmental Concern (not RNAs or ONAs)	X	X
Research Natural Areas		X
Outstanding Natural Areas		X
Environmental Education Areas		X
Special Habitats (cliffs, talus slopes, meadows, wetlands, etc.)	X	X
Developed Recreation Sites		X
Special Status Plant and Animal Sites	X	X
Connectivity/Diversity Blocks	X	
Late-Successional Reserves	X	
Riparian Reserves	X	
Wilderness		X
Wild and Scenic Rivers (designated and found suitable for designation)	X	
Wild and Scenic Rivers (tentative wild)		X

(Limited harvest in the following chart means harvesting will be restricted to certain seasons, amounts, sites/areas, etc.)

Species or Group	Limited Harvest	No Harvest
Special Status and SEIS Special Attention Species		X
Other Species	X	
Lily family (<i>Liliaceae</i>)	X	
Orchid family (<i>Orchidaceae</i>)	X	
Iris family (<i>Iridaceae</i>)	X	
Truffles	X	
Lichens	X	
Ferns	X	
Conifers (boughs)	X	
Mosses	X	
Mushrooms	X	

Establish specific guidelines for the management of individual special forest products using interdisciplinary review as needed. Management guidelines will be based on the ecological characteristics of the special forest products species and the requirements of associated plant, animal, and fungal species. Guidelines will include provisions that minimize changes in site productivity. Monitoring of harvest activities and the effects of harvest will be part of special forest products management. Feasibility to harvest newly identified special forest products species will receive interdisciplinary review.

Promote burning of dry fuelwood by activities such as making available copies of Oregon Department of Environmental Quality publications to fuelwood purchasers.

Energy and Minerals

Objectives

Maintain exploration and development opportunities for leaseable and locatable energy and mineral resources.

Provide opportunities for extraction of salable minerals by other government entities, private industry, individuals, and nonprofit organizations.

Continue to make available mineral resources on the reserved federal mineral estate.

Land Use Allocations

The amount of BLM-administered lands with potential for occurrence of energy and mineral resources and available for exploration and development is as follows:

Mineral Resources	Approx. BLM Acres
Leasable	392,200
Locatable	376,000
Salable	171,800

There are approximately 27,800 acres of private land with reserved federal mineral estate (also referred to as federal subsurface mineral estate).

See tables 2-4, 2-5, and 2-6 for restrictions on energy and mineral activities and appendix M for leasing stipulations and operating standards pertinent to locatable and salable minerals.

Management Actions/Direction - Riparian Reserves

NOTE: The following management actions/direction differ from the standards and guidelines in the SEIS record of decision, since the standards and guidelines are not all implementable under current laws and regulations. The stronger standards and guidelines in the SEIS record of decision (appendix E) will be adopted at such time as changes in current laws and/or regulations authorize their implementation.

For any proposed locatable mining operation in Riparian Reserves, other than notice level (activity on less than five acres) or casual use, require the following actions by the operator consistent with 43 Code of Federal Regulations 3809:

- Prepare a Plan of Operations, including a reclamation plan and reclamation bond for all mining operations in Riparian Reserves. Such plans and bonds will address the costs of removing facilities, equipment, and materials; recontouring of disturbed areas to an approved topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvaging and replacing topsoil; and revegetating to meet Aquatic Conservation Strategy objectives.
- Locate structures, support facilities, and roads outside Riparian Reserves. If no alternative to siting facilities in Riparian Reserves exists, locate in a way compatible with Aquatic Conservation Strategy objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Roads will be constructed and maintained to meet road management standards and to minimize damage to resources in Riparian Reserves. When a road is no longer required for mineral or land management activities, it will be reclaimed. In any case, access roads will be constructed consistent with 43 Code of Federal Regulations 3809 and acceptable road construction standards and will minimize damage to resources in Riparian Reserves.
- Avoid locating solid and sanitary waste facilities in Riparian Reserves. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Reserves exists, releases can be prevented, and stability can be ensured, then:
 - Analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.
 - Locate and design the waste facilities using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in Riparian Reserves.
 - Reclaim waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
 - Monitor waste and waste facilities after operations to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.
 - Require reclamation bonds adequate to ensure chemical and physical stability and to meet Aquatic Conservation Strategy objectives.

- Where an existing operator is in noncompliance at the notice level (i.e., causing unnecessary or undue degradation), require actions similar to those stated above to meet the intent of 43 Code of Federal Regulations 3809.

Table 2-4 Leasable Mineral Lease Restrictions

Restrictions	Approx. Acres
Closed - Nondiscretionary ¹	5,900
Open - No Surface Occupancy ²	221,000
Open - With Additional Restrictions ³	122,000
Open - With Standard Stipulations	49,200

¹ Congressionally designated areas including one wilderness area and one special area.

² Recreation sites, Recreation and Public Purposes Act and leases, special areas, visual resource management class I areas, corridors of designated wild, scenic and recreational rivers, corridors of rivers found suitable for designation as recreation rivers, Riparian Reserves, progeny test sites, seed orchard and forest disease research and study sites.

³ Special recreation management areas, Late-Successional Reserves, Connectivity/Diversity Blocks, District-Designated Reserve, visual resource management class II areas, steep slopes (over 60 percent), managed rural interface areas, raptor nests, special status species and SEIS special attention species.

Source: Western Oregon Digital Data Base.

Table 2-6 Salable Mineral Restrictions

Restrictions	Approx. Acres
Closed - Nondiscretionary ¹	5,900
Closed - Discretionary ²	220,400
Open - With Additional Requirements ³	122,600
Open - Standard Requirements	49,200

¹ Congressionally designated areas including one wilderness area and one special area.

² Corridors of rivers found suitable for designation as scenic or recreational, corridors of designated scenic or recreational rivers, special areas, some recreation sites, Recreation and Public Purposes and Federal Land Policy and Management Act leases, Riparian Reserves, and progeny test sites.

³ Some recreation sites and areas, Late-Successional Reserves, Connectivity/Diversity Blocks, District-Designated Reserve.

Source: Western Oregon Digital Data Base.

For leasable minerals, prohibit surface occupancy for oil, gas, and geothermal exploration and development activities where leases do not exist. Where possible, adjust the stipulations in existing leases to eliminate impacts that retard or prevent the attainment of Aquatic Conservation Strategy objectives consistent with existing lease terms and stipulations.

Allow development of salable minerals, such as sand and gravel, within Riparian Reserves only if Aquatic Conservation Strategy objectives can be met.

Develop inspection and monitoring requirements and include such requirements in exploration and mining plans and in leases or permits consistent with existing laws and regulations. Evaluate the results of inspection and monitoring to determine if modification of plans, leases and permits is needed to eliminate impacts that retard or prevent attainment of Aquatic Conservation Strategy objectives.

Management Actions/Direction - Late-Successional Reserves

Assess the impacts of ongoing and proposed mining activities in Late-Successional Reserves.

Include stipulations in mineral leases and, when legally possible, require operational constraints for locatable mineral activities to minimize detrimental effects on late-successional habitat.

Table 2-5 Locatable Mineral Restrictions

Restrictions	Approx. Acres
Closed - Nondiscretionary ¹	5,900
Closed - Discretionary ²	16,200
Open - With Additional Requirements ³	326,800
Open - Standard Requirements	49,200

¹ Congressionally designated areas including one wilderness area and one special area.

² Special areas, designated and suitable scenic and recreational rivers, most recreation sites and areas, and Recreation and Public Purposes and Federal Land Policy and Management Act leases, and progeny test sites.

³ Some recreation sites and areas, Late-Successional Reserves, Connectivity/Diversity Blocks, District-Designated Reserve, and Riparian Reserves.

Source: Western Oregon Digital Data Base.

Management Actions/Direction - All Land Use Allocations

Leasable Minerals

Use standard and special stipulations for oil, gas, geothermal, and coal leases to protect fragile areas or critical resource values (see appendix M for a list of mineral restrictions by resource value). Special stipulations may include:

- seasonal restrictions to protect resources such as critical wildlife habitat, prevent excessive erosion, etc.;
- controlled surface use stipulations to protect valuable resources in small areas; and
- no surface occupancy stipulations to protect valuable resources scattered over a large area while still providing an opportunity for exploration and development.

Waive special stipulations if the objective of a stipulation could be met in another way.

Provide opportunities for coal and geothermal exploration and development in areas with potential for occurrence. Coal activities are regulated under 43 Code of Federal Regulations 3400 and geothermal activities are regulated under 43 Code of Federal Regulations 3200.

Allow no leasing on lands within incorporated cities. Tracts within the planning area affected by this type of closure are located in Salem and Willamina.

Locatable Minerals

Use general requirements in 43 Code of Federal Regulations 3809 and site-specific guidelines to avoid unnecessary or undue degradation of resources on mining claims.

Allow activities exceeding casual use, but disturbing five acres or less, to proceed 15 days after a notice is filed in the Salem District Office.

Require an approved plan of operation before work can begin on projects disturbing more than five acres or special resource areas.

Require bonding of plans of operation to ensure mitigating measures are followed and reclamation of the disturbed lands is completed.

Require reclamation at the earliest feasible time for all surface-disturbing operations, whether conducted under a notice or approved plan of operations.

Salable Minerals

Address quarry development, management and reclamation needs through watershed analyses and project planning.

Emphasize long-term regional quarry use.

Develop new quarry sites in locations consistent with overall management objectives and guidelines of the proposed resource management plan.

Continue to use rock from existing quarries for construction and maintenance of timber sale access roads and other purposes.

Make salable minerals available for other government agencies if requested, and if the action is consistent with management direction for protection of other resources.

Issue sales contracts for mineral materials which provide for reclamation of mined lands pursuant to 43 Code of Federal Regulations 3604 or 3610.

Consider mineral material permits on a case-by-case basis. Issue them at the discretion of the area manager.

Issue free use permits to government agencies and nonprofit organizations pursuant to 43 Code of Federal Regulations 3620. Designate new common use areas or community pits only if the level of localized activity warrants.

Reserved Federal Mineral Estate

Allow the reserved federal mineral estate to remain open for mineral development.

Allow development of locatable and salable minerals in accordance with restrictions determined by the surface owner/administrator.

Convey mineral interest owned by the United States where the surface is, or will be, in nonfederal ownership, to the existing or proposed owner of the surface estate only after a determination is made under section 209(b) of the Federal Land Policy and Management Act.

Land Tenure Adjustment

Objectives

Make land tenure adjustments to benefit a variety of uses and values. Emphasize opportunities that conserve biological diversity or enhance timber management opportunities. As a matter of practice, Oregon and California forest lands allocated to timber management will only be exchanged for lands to be managed for multiple-use purposes.

Meet the following objectives for the three land tenure adjustment zones:

- **Zone 1:** generally, retain these lands under BLM administration.
- **Zone 2:** block up areas in zone 2 with significant resource values and exchange other lands in zone 2 to block up areas in zones 1 and 2 with significant resource values.
- **Zone 3:** retain lands with unique resource values; dispose of other lands in this zone using appropriate disposal mechanisms.

Make BLM-administered lands in zones 1, 2, and 3 available for a variety of uses as authorized by section 302 of the Federal Land Policy and Management Act, the Recreation and Public Purposes Act, and special recreation permits.

Manage newly acquired lands for the purpose for which they are acquired or consistent with the management objectives for adjacent BLM-administered lands. If lands with unique or fragile resource values are acquired, protect those values until the next plan revision.

Eliminate unauthorized use of BLM-administered lands.

Land Use Allocations

Zone	Approx. BLM Acres
1	160,200
2	228,000
3	9,900

See map 2-8 for location of land tenure zones and appendix N for legal descriptions of zone 3 tracts.

Management Actions/Direction - Riparian Reserves

Use land acquisition, exchange, and conservation easements to meet Aquatic Conservation Strategy objectives and facilitate restoration of fish stocks and others species at risk of extinction.

Management Actions/Direction - Late-Successional Reserves

Consider land exchanges when they will provide benefits equal to or better than current conditions.

Consider land exchanges especially to improve area, distribution, and quality (e.g., connectivity, shape, and contribution to biological diversity) of Late-Successional Reserves and where public and private lands are intermingled.

Management Actions/Direction - All Land Use Allocations

Use the land tenure adjustment criteria listed in appendix O when analyzing site-specific proposals to acquire or dispose of land.

Use the following three zone concept to guide selection of lands for exchange, sale, transfer, or acquisition:

- **Zone 1:** includes lands and other areas identified as having high public resource values. The natural resource values may require protection by federal law, executive order or policy. These lands may have other values or natural systems which merit long-term public ownership. They do not meet the criteria for sale under Federal Land Policy and Management Act section 203(a) and will generally be retained in public ownership.

The primary mode of land acquisition in zone 1 will be through exchange of BLM-administered lands in zones 2 and 3. Purchases and donations will be pursued if exchange is not feasible.

- **Zone 2:** includes lands that meet criteria for exchange because they form discontinuous ownership patterns, are relatively inefficient to manage, and may not be accessible to the general public. These BLM-administered lands may be

blocked up in exchange for other lands in zones 1 or 2, transferred to other public agencies, or given some form of cooperative management. These lands will not be sold under section 203(a) unless the resource management plan is amended.

- **Zone 3:** Includes lands that are scattered and isolated with no known unique resource values. Zone 3 lands will be available for use in exchanges for inholdings in zone 1 (high priority) or zone 2 (moderate priority). They are also potentially suitable for disposal through sale under Federal Land Policy and Management Act section 203(a). This will occur only if important recreation, wildlife, watershed, threatened or endangered species habitat and/or cultural values are not identified during disposal clearance reviews and no viable exchange proposals for them can be identified. Zone 3 lands will also be available for conveyance to another federal, state or local agency, as needed to accommodate community expansion and other public purposes. Transfer to another federal agency to fulfill a specific management objective will also be permitted in zone 3.

Prior to all land tenure adjustments, consider the effect on the mineral estate. If the lands are not known to have mineral potential, then the mineral interest will normally be transferred simultaneously with the surface interest.

Consider conveying the subsurface mineral interest held by the United States to the existing or proposed owner of the surface estate.

Make exchanges to enhance public resource values and/or improve land patterns and management efficiency of private and BLM-administered lands within the planning area.

Consult with county governments prior to any exchange involving Oregon and California lands.

Minimize impact on local tax base by emphasizing exchanges rather than fee purchase.

Sell BLM-administered lands under the authority of Federal Land Policy and Management Act section 203(a), which requires that at least one of the following conditions exist before land is offered for sale:

- The tract, because of its location or other characteristics, is difficult or uneconomical to manage as part of BLM-administered lands and is not suitable for management by another federal department or agency.

- The tract was acquired for a specific purpose and is no longer required for any federal purpose.
- Disposal of the tract would serve important BLM objectives. These include but are not limited to:
 - expansion of communities and economic development, which cannot be achieved prudently or feasibly on land other than BLM-administered lands and which outweigh other public objectives; and
 - values, including, but not limited to, recreation and scenic values, which would be served by maintaining such tract in federal ownership.
- Transfer land to other public agencies where consistent with public land management policy and where improved management efficiency will result. Minor adjustments involving sales or exchanges may be made based on site-specific application of the land ownership adjustment criteria.

Acquire land through exchange if at least one of the following objectives is met:

- access to public lands and resources would be improved;
- important public values and uses would be maintained or enhanced;
- local social and economic values would be maintained or enhanced; and
- other aspects of the approved resource management plan would be implemented.

Rights-of-Way

Objectives

Continue to make BLM-administered lands available for needed rights-of-way where consistent with local comprehensive plans, Oregon statewide planning goals and rules, and the exclusion and avoidance areas identified in this proposed resource management plan.

Ensure that all rights-of-way for hydroelectric development are consistent with the Northwest Power Planning Council guidance, which recommends prohibiting future hydroelectric development on certain rivers and streams with significant fisheries and wildlife values.

Land Use Allocations

Allocation of lands to existing rights-of-way will continue.

Rights-of-Way	Number
High voltage transmission lines	5
Communication sites	8

Locations are shown on map 2-9.

Subject to valid existing rights and with the exception of buried lines in rights-of-way of existing roads, exclude rights-of-way in the following areas:

Exclusion Area	Approx. BLM Acres
Research Natural Areas	3,600
Wild River (eligible Elkhorn Creek segment)	800
Wilderness Area	5,800
Visual Resource Management Class I Areas	14,100

Subject to valid existing rights and with the exception of buried lines in rights-of-way of existing roads, avoid locating rights-of-way in the following areas:

Avoidance Area	Approx. BLM Acres
Recreation Sites (existing and proposed)	1,100
Special Areas (except research natural areas)	4,900
Scenic and Recreational Rivers (suitable, designated)	9,200
Visual Resource Management Class II Areas	22,800
Late-Successional Reserves	211,900
District-Designated Reserve	1,800

Future rights-of-way may be granted in avoidance areas when no feasible alternative route or designated right-of-way corridor is available.

Management Actions/Direction - Riparian Reserves

Issue rights-of-way to avoid adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where legally possible, adjust existing rights-of-way to eliminate adverse effects that retard or prevent the attainment of Aquatic Conservation Strategy objectives. If adjustments are not effective and where legally possible, eliminate the activity. Priority for modifying existing rights-of-way will be based on the actual or potential impact and the ecological value of the riparian resources affected.

For proposed hydroelectric projects under the jurisdiction of the Federal Energy Regulatory Commission (the Commission), provide timely, written comments regarding maintenance of instream flows and habitat conditions and maintenance/restoration of riparian resources and stream channel integrity. Request the Commission to locate proposed support facilities outside of Riparian Reserves. For existing support facilities inside Riparian Reserves that are essential to proper management, provide recommendations to the Commission that ensure Aquatic Conservation Strategy objectives are met. Where these objectives cannot be met, provide recommendations to the Commission that such support facilities should be relocated. Existing support facilities that must be located in the Riparian Reserves should be located, operated, and maintained with an emphasis to eliminate adverse effects that retard or prevent attainment of Aquatic Conservation Strategy objectives.

For other hydroelectric and surface water development proposals in Tier 1 Key Watersheds, require instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies. For other hydroelectric and surface water development proposals in all other watersheds, give priority emphasis to instream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. Coordinate this process with the appropriate state agencies.

Management Actions/Direction - Late-Successional Reserves

Retain and maintain existing developments, such as utility corridors and electronic sites, consistent with other management actions/direction for Late-Successional Reserves.

Neither construct nor authorize new facilities that may adversely affect Late-Successional Reserves.

Review on a case-by-case basis new development proposals. They may be approved when adverse effects can be minimized and mitigated.

Locate new developments to avoid adverse effects on identified late-successional species.

Remove hazard trees along utility rights-of-way and in other developed areas.

Management Actions/Direction - Other Land Use Allocations

Encourage location of major new rights-of-way projects in existing utility/transportation routes and other previously designated corridors.

Encourage applicants to consult the Western Regional Corridor Study in planning route locations.

Consider new locations for rights-of-way projects on a case-by-case basis. Applications may be approved where the applicant can demonstrate that use of an existing route or corridor would not be technically or economically feasible; and the proposed project would otherwise be consistent with this proposed resource management plan and would minimize damage to the environment.

Allow expansion of communications facilities on existing communication sites.

Consider new communication sites on a case-by-case basis. Applications may be approved where the applicant can demonstrate that use of an existing, developed communication site would not be technically feasible; and the proposed facility would otherwise be consistent with this proposed resource management plan and would minimize damage to the environment.

Access Objectives

Acquire access to public lands to assist various programs to meet management objectives.

Land Use Allocations

None.

Management Actions/Direction

Acquire access by obtaining easements, entering into new reciprocal right-of-way agreements, or amending existing reciprocal right-of-way agreements. Condemnation for access will be pursued when necessary.

Acquire perpetual exclusive easements whenever possible to provide for public access and BLM control. Acquire nonexclusive easements, which do not provide for public access, consistent with management objectives and where no public access is needed. Acquire temporary easements only when other options are not available.

Continue to obtain access across lands of private companies or individuals who are a party (permittee) to existing reciprocal right-of-way agreements through appropriate agreements. Whenever a willing permittee is identified and it is determined there is a need for public access, negotiations could be started to provide for the acquisition of public access rights.

Emphasize acquisition for public access on major travel routes.

Withdrawals

Objectives

Protect lands with important resource values and/or significant levels of investment by withdrawing them from the operation of public land and mineral laws. Withdrawal is necessary to avoid irreparable damage that may be caused by nondiscretionary activities.

Land Use Allocations

Acres in existing withdrawals are shown in table 2-7. Acres of land classifications are shown in table 2-8.

BLM-proposed withdrawals are as follows:

Area	Approx. BLM Acres
Recreation Sites (five existing sites and ten proposed sites)	1,000
Special Recreation Management Area (Marys Peak)	2,300
Special Areas	7,300
Wild and Scenic Rivers (designated and suitable for designation)	9,100
Progeny Test Sites	700
Lands along U.S. Highway 101 (see legal description in appendix Q)	200

Management Actions/Direction

See Management of Newly Acquired Lands (toward the end of this chapter).

Complete the review of existing withdrawals to determine whether continuation of the withdrawal is consistent with the statutory objectives of the programs for which the lands were dedicated and with other important programs.

Terminate unnecessary or duplicative withdrawals and continue those which still meet the intent of the withdrawal. See table 2-7.

Prior to any management activity on withdrawn lands returned to BLM by termination or revocation, conduct required resource surveys and complete all required planning and environmental assessment work.

Initiate action on the BLM-proposed withdrawals listed under land use allocations. This will involve recommendations to and approval by the secretary of the Department of the Interior.

Evaluate future withdrawal proposals for compliance with program objectives and federal law and recommend appropriate action to the secretary of the Department of the Interior.

Limit withdrawals to the minimum area needed and restrict only those activities that would be detrimental to the purposes of the withdrawal.

When the lease for the J.J. Collins Memorial Park expires, review it and determine whether it should be extended. All other classifications will remain in effect during the life of the plan. See table 2-8.

Table 2-7 Land Withdrawals and Recommendations to Maintain or Revoke Withdrawals

Authority ¹	Location	Approx. Acres	Purpose/ Name	Segregative Effect ²	Surface Manage. Agency ³	Recommendation to maintain or revoke and rationale
Act of Congress (3/5/80)	T. 10 S., R. 11 W., Section 30, Lincoln County	100	Outstanding Natural Area/ Yaquina Head	A	BLM, USCG	Maintain - withdrawal is still serving its original purpose
Act of Congress (6/26/84)	T. 7 S., R. 3 and 4 E., Clackamas County	5,800	Wilderness/ Table Rock	A	BLM	Maintain - withdrawal is still serving its original purpose
ANS 58-1	T. 15 S., R. 7 W., Section 7, Benton County	110	Air navigation/ Prairie Mtn.	B	FAA	Revoke 40 acres - not needed for air navigation; maintain 70 acres - serving orig. purpose
EO (6-8-1886)	T. 10 S., R. 11 W., Section 30, Lincoln County	5	Lighthouse/ Yaquina Head	A	USCG	Maintain - existing withdrawal is serving its original purpose - protecting site
PLO 989	T. 3 S., R. 5 E., Sections 27 and 28, Clackamas County	600	Fish hatchery/ Eagle Creek	B	USFWS	Maintain - developed facility is still needed
PLO 3015	T. 4 S., R. 3 E., Section 13, Clackamas County	160	Seed orchard/ Walter Horning	B	BLM	Maintain - withdrawal is still serving its original purpose
PLO 3609	T. 4 S., R. 3 E., Section 23, Clackamas County	320	Seed orchard/ Walter Horning	B	BLM	Maintain - site serves beneficial purpose and is being further developed
PLO 3869	T. 3 S., R. 7 W., Section 32, Tillamook County	1,010	Recreation/ Nestucca River	B	BLM	Maintain - Rights-of-way under Section 507 of FLPMA would not be adequate
PLO 4305	T. 14 S., R. 7 W., Section 25, Benton County	132	Recreation/ Alsea Falls	B	BLM	Maintain - existing withdrawal is still serving its original purpose - protecting site
PLO 4537	T. 2 S., R. 7 E., Section 31, Clackamas County	529	Recreation/ Wildwood	C	BLM	Partial revocation - 100 acres - not necessary for proposed improvements; remainder of withdrawal is still serving its original purpose
PLO 4846	T. 8 S., R. 10 W., Section 27, Lincoln County	12	Road use	B	USFS	Revoke - suitable alternatives to withdrawal exist - third party easements
PLO 5136	T. 12 S., R. 7 W., Section 28, Benton County	40	Admin. site/ Marys Peak	B	USFS	Maintain - lands are being used for purposes they were withdrawn
PLO 5372	T. 8 S., R. 6 W., Section 33, Benton County	80	Research Natural Area/Little Slink	B	BLM	Maintain - withdrawal is still serving its original purpose

Table 2-7 Land Withdrawals and Recommendations to Maintain or Revoke Withdrawals (continued)

Authority ¹	Location	Approx. Acres	Purpose/ Name	Segregative Effect ²	Surface Manage. Agency ³	Recommendation to maintain or revoke and rationale
PP 477	T. 2 S., R. 4 E., Section 1, and T. 2 S., R. 5 E., Sections 13 and 15, Clackamas County	48	Electric power generation/ Sandy River-Marmot Dam (Bull Run Project)	B	FERC/BLM	Maintain - withdrawal is still serving its original purpose
PP 2195	T. 4 S., R. 4 E., Section 13, and T. 4 S., R. 5 E., Section 7, Clackamas County	197	Electric power generation/ Clackamas	B	FERC/BLM	Maintain - withdrawal is still serving its original purpose
PSC 170	T. 7 S., R. 3 and 4 E., Clackamas County	1,879	Potential power development/ Molalla River	C	BLM	Revoke - not necessary for potential power development
PSC 171	T. 8 S., R. 8 W. Lincoln County	957	Pot. power dev./ Siletz River	C	BLM	Not yet reviewed
PSC 304	T. 5 N., R. 6 and 7 W. and T. 3 N., R. 8 W. Clatsop County	64	Pot. power dev./ Nehalem River	C	BLM	Not yet reviewed
PSC 413	T. 14 and 15 S., R. 8 W. Benton County	316	Pot. power dev./ Alsea River	C	BLM	Not yet reviewed
PSR 89	T. 3 N., R. 8 W. Tillamook County	61	Pot. power dev./ Nehalem River	C	BLM	Not yet reviewed
PSR 94	T. 6 and 7 S., R. 3 E. Clackamas County	1,325	Pot. power dev./ Molalla River	C	BLM	Maintain - withdrawal is still serving its original purpose
PSR 458	T. 12 S., R. 1 W., Linn County	11	Pot. power dev./ S. Santiam River	C	BLM	Not yet reviewed
PSR 658, WPD 15	T. 2 S., R. 4 E. T. 3 S., R. 3 E. Clackamas County	5	Electric trans. lines	C	BLM	Revoke - no power lines to be protected
PSR 659, WPD 14	Various	6,149	Pot. power dev./ Alsea, Nehalem, Nestucca, Scappoose and Trask Rivers	C	BLM	Not yet reviewed
PSR 660, WPD 14	T. 1 and 2 S., R. 4, 5, 6 and 7 E. Multnomah and Clackamas Counties	3,356	Pot. power dev./ Sandy River	C	BLM	Revoke - water power development unlikely

Table 2-7 Land Withdrawals and Recommendations to Maintain or Revoke Withdrawals (continued)

Authority ¹	Location	Approx. Acres	Purpose/ Name	Segregative Effect ²	Surface Manage. Agency ³	Recommendation to maintain or revoke and rationale
PSR 661, WPD 14	Various	10,370	Pot. power dev./ Clackamas, Luckiamute, Molalla, Santiam, Tualatin and Yamhill Rivers	C	BLM	Not yet reviewed
PSR 664	Various	1,143	Pot. power dev./ Eagle Creek, South Yamhill, Molalla, and N. Santiam Rivers	C	BLM	Not yet reviewed
PSR 730, WPD 14, WPD 16	Various	1,900	Pot. power dev./ Clackamas, Nestucca, Sandy and Santiam Rivers	C	BLM	Not yet reviewed
REC WDL 49	T. 8 S., R. 2 E. Marion County	200	Recreation/ Silver Falls	B	BLM	Revoke - no longer valid - Recreation and Public Purposes leased to the State of Oregon

¹ Authority Abbreviations:

- ANS - Air Navigation Site
- EO - Executive Order
- PLO - Public Land Order
- PP - Power Project
- PSC - Power Site Classification
- PSR - Power Site Reserve
- SO - Secretarial Order
- WPD - Water Power Designation

² Segregative Effect:

- A - Withdrawn from operation of the general land laws, the mining laws and the mineral leasing laws;
- B - Withdrawn from operation of the general land laws and the mining laws;
- C - Withdrawn from operation of the general land laws only.

³ Agency Acronyms:

- BLM - Bureau of Land Management
- FAA - Federal Aviation Administration
- FERC - Federal Energy Regulatory Commission
- USCS - U.S. Coast Guard
- USFS - U.S. Forest Service
- USFWS - U.S. Fish and Wildlife Service
- USGS - U.S. Geological Survey

Source: Salem District realty records.

Table 2-8 Land Classifications

Type of Classification	Location	Acres	Purpose and Serial Number	Name
R&PP	T. 9 S., R. 4 W., Section 14 and 23	61.4	County Park Polk County (OR 36110)	Wells Island
R&PP	T. 3 N., R. 1 W., Section 9	1.2	County Park Columbia County (OR 7285) ¹	J.J. Collins Mem. Park
R&PP	T. 8 S., R. 1 E., Section 3	200	State Park State of Oregon (OR 27240)	Silver Falls
R&PP	T. 8 S., R. 1 E., Section 35 T. 8 S., R. 2 E., Section 31	44	State Park State of Oregon (OR 34517)	Silver Falls
R&PP	T. 2 N., R. 2 W., Section 15	1.3	Fire Station Multnomah County (OR 36110)	—
R&PP	T. 11 S., R. 3 E., Sections 25, 26 and 35 T. 12 S., R. 3 E., Sections 2, 3 and 10	459.2	Recreation Area Linn County (OR 36783)	Quartzville Creek
R&PP	T. 4 N., R. 3 W., Section 7	7.6	County Park Columbia County (OR 41597)	Scaponia
R&PP	T. 1 S., R. 5 E., Section 3	3.4	Water Treatment Plant Corbett Water District (OR 41744)	Corbett
R&PP	T. 1 S., R. 4 E., Sections 11 and 15	280	County Park Multnomah County (OR 10366)	Oxbow
R&PP	T. 9 S., R. 2 E., Section 9	10	County Park Marion County (OR 11999)	L. North Fork

R&PP = Recreation and Public Purposes Lease

¹ Expires 5/26/96

Source: Salem District realty records.

Roads

Objectives

Develop and maintain a transportation system that serves the needs of users in an environmentally sound manner. Arterial and major collector roads will form the backbone of the transportation system in the planning area.

Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where such problems exist.

Manage roads to meet the needs identified under other resource programs (e.g., road closures for wildlife). Road management actions/direction are mentioned or implied primarily under Aquatic Conservation Strategy objectives, Riparian Reserves, Late-Successional Reserves, Water Quality and Soils, Wildlife, Fish Habitat, Special Status and SEIS Special Attention Species Habitat, Timber Resources, and Recreation.

Land Use Allocations

As of May 1993, there were approximately 2,555 miles of roads on BLM-administered lands in the district.

Management Actions/Direction - Riparian Reserves

Cooperate with federal, state, and county agencies and work with parties with road use agreements to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

- completing watershed analyses, including appropriate geotechnical analyses (i.e., examining soil and rock conditions in riparian and stream crossings) prior to construction of new roads or landings in Riparian Reserves;
- minimizing road and landing locations in Riparian Reserves;
- preparing road design criteria, elements, and standards that govern construction and reconstruction;

- preparing operation and maintenance criteria that govern road operation, maintenance, and management; minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow;
- restricting sidecasting as necessary to prevent the introduction of sediment to streams; and
- avoiding wetlands entirely when constructing new roads.

Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:

- reconstructing roads and associated drainage features that pose a substantial risk;
- prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected; and
- closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.

Design and construct new culverts, bridges and other stream crossings and improve existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions. New structures and improvements will be designed to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

Minimize sediment delivery to streams from roads. Outslipping of the roadway surface is preferred, except in cases where outslipping would increase sediment delivery to streams or where outslipping is infeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (e.g., streams which can be made available to anadromous fish by removing obstacles to passage).

Management Actions/Direction (continued)

Develop and implement a Road Management Plan or a Transportation Management Plan that meets the Aquatic Conservation Strategy objectives. As a minimum, this plan will include provisions for the following activities:

- inspections and maintenance during storm events;
- inspections and maintenance after storm events;
- road operation and maintenance giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources;
- traffic regulation during wet periods to prevent damage to riparian resources; and
- establishing the purpose of each road by developing the road management objective.

Management Actions/Direction - Late-Successional Reserves

Construct roads in Late-Successional Reserves if the potential benefits of silviculture, salvage, and other activities exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, routed through unsuitable habitat where possible, and designed to minimize adverse impacts. Alternative access, such as aerial logging, should be considered to provide access for activities in reserves.

Fall trees along rights-of-way if they are a hazard to public safety. Consider leaving material on site if available coarse woody debris is inadequate. Consider topping of trees as an alternative to falling.

Management Actions/Direction - Key Watersheds

Reduce existing road mileage within key watersheds. If funding is insufficient to implement reductions, neither construct nor authorize through discretionary permits a net increase in road mileage in Key Watersheds.

Management Actions/Direction - All Land Use Allocations

Address road management planning on a watershed basis consistent with Late-Successional Reserves, Riparian Reserves, and other major allocations. Specific road closures will be determined using standard analysis, public involvement, and notification procedures. District off-highway vehicle designations (open, limited or closed to use of motorized vehicles) will be adjusted to conform to the approved road management plan.

Determine standards for new road construction during the project planning process. Standards will be the minimum necessary to meet objectives.

Minimize new road construction in areas with fragile soils to reduce impacts to soils, water quality, and fisheries. Stabilize existing roads where they contribute to significant adverse effects on these resources.

Locate, design, construct, and maintain roads to standards that meet management objectives in accordance with the district road management plan.

Follow best management practices (see appendix G) for water quality and soil productivity to mitigate adverse effects on soils, water quality, fish, and riparian habitat during road construction and maintenance.

Reduce road density by closing minor collector and local roads in areas or watersheds where water quality degradation, big game harassment, or other road-related resource problems have been identified.

Acquire water rights for road management purposes.

When roads are constructed in Key Watersheds under non-discretionary permits, close and restore at least an equal amount of existing roads to meet the management action/direction of reducing road mileage.

Noxious Weeds

Objectives

Contain and/or reduce noxious weed infestations on BLM-administered lands using an integrated pest management approach. Some noxious weeds expected to be subject to control are tansy ragwort, Canadian thistle, scotch broom, and knapweed.

Avoid introducing or spreading noxious weed infestations in any areas.

Land Use Allocations

No allocations are made for noxious weeds in the planning process.

Management Actions/Direction - Late-Successional Reserves

Evaluate impacts of nonnative plants (weeds) growing in Late-Successional Reserves.

Develop plans and recommendations for eliminating or controlling nonnative plants (weeds) which adversely effect Late-Successional Reserve objectives. Include an analysis of effects of implementing such programs on other species or habitats within reserves.

Management Actions/Direction - All Land Use Allocations

Continue to survey BLM-administered lands for noxious weed infestations, report infestations to the Oregon Department of Agriculture, and work with them to reduce infestations.

Use control methods which do not retard or prevent attainment of Aquatic Conservation Strategy objectives.

Apply integrated pest management methods (e.g., chemical, mechanical, manual and/or biological) in accordance with BLM's multistate environmental impact statement for noxious weed control (U.S. Department of the Interior, BLM, OSO 1985 and 1987) and the related record of decision.

Hazardous Materials

Objectives

Minimize use of hazardous materials and eliminate known hazardous wastes on BLM-administered lands.

Land Use Allocations

No allocations are made for hazardous material sites in the planning process.

Management Actions/Direction

Identify, investigate, and arrange for removal of hazardous wastes on BLM-administered lands in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (the Act). Emergency response will be as specified in the District Hazardous Materials Contingency Plan. The response will include cleanup, proper notifications, criminal investigations, risk assessment, and other actions consistent with the Act and the nature of the emergency.

Store, treat and dispose of hazardous materials in accordance with the Resource Conservation and Recovery Act and other appropriate regulations.

Use the Emergency Planning and Community Right-To-Know Act to coordinate emergency planning with state and local jurisdictions concerning hazardous materials, emergency notifications and routine reporting of hazardous materials inventories.

Remove and replace, if appropriate, all existing underground storage tanks with above ground storage facilities following state and federal regulations.

Until known hazardous wastes on BLM-administered lands are removed, protect employees and the public from exposure.

Provide information to the public regarding the need to properly dispose of hazardous wastes and the danger of becoming exposed.

Fire/Fuels Management

Objectives

Provide appropriate fire suppression responses to wildfires that will help meet resource management objectives.

Use prescribed fire to meet resource management objectives. This will include but not be limited to fuels management for wildfire hazard reduction, restoration of desired vegetation conditions, management of habitat, and silvicultural treatments.

Adhere to smoke management/air quality standards of the Clean Air Act and state implementation plan for prescribed burning.

Land Use Allocations

None specifically for fire/fuels management.

Management Actions/Direction - General

Apply the management actions/direction in the Special Status and SEIS Special Attention Species and Habitat section.

Address fire/fuels management for all land use allocations as part of watershed analysis and project planning.

Coordinate fire management activities in rural interface areas with local governments, agencies, and landowners. During watershed analysis, identify additional factors which may affect hazard reduction goals.

Management Actions/Direction - Riparian Reserves

Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies will recognize the role of fire in ecosystem function and

identify those instances where fire suppression or fuel management activities could be damaging to long-term ecosystem function.

Locate incident bases, camps, helibases, staging areas, helispots and other centers for incident activities outside of Riparian Reserves. If the only suitable location for such activities is within the Riparian Reserve, an exemption may be granted following a review and recommendation by a resource advisor. The advisor will prescribe the location, use conditions, and rehabilitation requirements. Utilize an interdisciplinary team to predetermine suitable incident base and helibase locations.

Minimize delivery of chemical retardant, foam, or other additives to surface waters. An exception may be warranted in situations where over-riding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor, when an escape would cause more long-term damage.

Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by a wildfire or a prescribed fire burning outside prescribed parameters.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

Locate and manage water drafting sites (e.g., sites where water is pumped to control or suppress fires) to minimize adverse effects on riparian habitat and water quality as consistent with Aquatic Conservation Strategy objectives.

Management Actions/Direction - Late-Successional Reserves

Emphasize maintaining late-successional habitat in wildfire suppression plans.

Use minimum impact suppression methods for fuels management in accordance with guidelines for reducing risks of large-scale disturbances.

During fire suppression activities, consult with an interdisciplinary team to assure that habitat damage is minimized.

Until a fire management plan is completed for a Late-Successional Reserve or group of reserves, suppress wildfire to avoid loss of habitat and to maintain future management options.

Prepare a specific fire management plan prior to any habitat manipulation activities in Late-Successional Reserves. Specify how hazard reduction and other prescribed fire applications meet the objectives of the Late-Successional Reserve. Until the plan is approved, proposed activities will be subject to review by the Regional Ecosystem Office.

Apply prescribed fire in a manner which retains the amount of coarse woody debris determined through watershed analysis.

Allow some natural fires to burn under prescribed conditions. This decision will be based on additional analysis and planning.

Consider rapidly extinguishing smoldering coarse woody debris and duff.

Management Actions/Direction - Adaptive Management Areas

Explore and support opportunities to research the role and effects of fire management on ecosystem functions.

Emphasize fire/fuels management cooperation across agency and ownership boundaries.

Follow fire/fuels management actions/direction in this proposed resource management plan until Adaptive Management Area plans are completed.

Use accepted wildfire suppression strategies and tactics and conform with specific agency policy.

Management Actions/Direction - Matrix

Plan and implement prescribed fire treatments to minimize:

- intensive burning, unless appropriate for certain specific habitats, communities, or stand conditions;
- consumption of litter and coarse woody debris;
- disturbance of soil and litter that may occur as a result of heavy equipment operation; and
- the frequency of treatments.

Management Actions/Direction - All Land Use Allocations

Wildfire Suppression

Minimize the negative impacts of wildfire on ecosystem management objectives.

Respond to all wildfires. In most cases, responses will consist of aggressive initial attack to extinguish fires at the smallest size possible.

For wildfires that escape initial attack, consult with an interdisciplinary team to develop an analysis for containment of each wildfire (including escaped prescribed fires) and to evaluate the potential suppression damage compared to potential wildfire damage. Suppression tactics will consider:

- the safety of firefighting personnel;
- how best to achieve coordination of wildfire suppression activities to avoid causing adverse impacts on federal and nonfederal lands;
- protection of specific attributes of each land use allocation;
- the appropriate use of suppression tools such as aircraft, bulldozers, pumps and other mechanized equipment, and a clear definition of any restrictions relating to their use;
- the potential adverse effects on meeting ecosystem management objectives;
- protection of forest structural components such as snags, duff, and coarse woody debris to the extent possible; and
- the rehabilitation of damaged areas.

Management Actions/Direction (continued)

Prescribed Fire

Develop project-level prescribed fire plans using an interdisciplinary team approach. Plans will address:

- adherence to smoke management and air quality standards;
- meeting stated objectives for the land use allocations;
- maintaining or restoring ecosystem processes or structure; and
- the role of natural fire in specific landscapes, current ecosystem needs, and wildfire hazard analysis included in the fire management plan.

Fuels Management for Hazard Reduction

Modify the amount and type of fuels in order to lower the potential of fire ignition and rate of spread; protect resources by lowering the risk of high intensity, stand-replacing wildfires; and adhere to smoke management and air quality standards.

Reduce fire hazard through methods such as prescribed burning, mechanical or manual manipulation of forest vegetation and debris, removal of forest vegetation and debris, and combinations of these methods. Hazard reduction plans will be developed through an interdisciplinary team approach and will consider the following:

- providing for the safety of firefighting personnel;
- identification of levels of coarse woody debris and snags of adequate size and in sufficient quantities to meet habitat requirements of species of concern;
- developing a fuel profile that supports land allocation objectives; and
- seeking a balance between reducing the risk of wildfire and the cost efficiency consistent with meeting land allocation objectives.

Management Direction Common to Alternatives A through E General

With a few exceptions noted in the text, the following management direction would apply fully to alternatives A, B, D, and E. The no action alternative and alternative C differ from the other alternatives in several important respects, which are noted in this section.

Management direction for monitoring and research, further environmental assessment, use of the completed plan and management of newly acquired lands is described at the end of Management Direction by Alternative.

The alternatives in this section do not assume that required levels of protection of listed or proposed species are known unless there was a recovery plan in effect before the alternatives were formulated. Thus, some alternatives provide no specific allocation of lands for protection of spotted owls. However, most alternatives include allocations providing some protection for spotted owls.

All management practices have a goal of maintaining long-term site productivity of soils. Methods of achieving this goal would be best management practices and minimal disturbance of fragile sites. For a list of best management practices and a description of management guidance for fragile sites, see appendix G. Figure 2-2 is an illustration of the Timber Production Capability Classification System, which includes two fragile categories.

A road management plan would be developed for the district. The purpose of the plan would be to identify BLM-administered roads and areas which should be open, closed or limited to motorized vehicular travel. Closures and limitations would be used to meet a variety of land management objectives, including protection of watersheds, protection of special status species habitat and improvement of big game habitat and reclamation of land for timber production. The planning process would include interdisciplinary team review, public involvement and public notification.

The BLM would aid and support the Oregon Economic Development Department's efforts to help communities develop and implement alternative economic strategies. Aid and support would consist mostly of coordination and prioritization of BLM recreation and fisheries development activities. These activities are mutually perceived as benefiting the identified economic strategies.

Water Quality and Riparian Zones

To assure protection of water and water-dependent resources, the BLM would continue to implement a nonpoint source management program in cooperation with the U.S. Environmental Protection Agency and the Oregon Department of Environmental Quality. Section 319 of the Clean Water Act directs the states to prepare a statewide management plan which outlines a nonpoint source pollution control program. Oregon's nonpoint source management program (Oregon Department of Environmental Quality 1988a) includes two goals for nonpoint source prevention and control efforts: (1) the protection of water quality necessary for full support of the various designated beneficial uses of water; and (2) the maintenance of high quality waters wherever they are found. The amended Clean Water Act directs federal agencies to comply with state water quality requirements to restore, maintain and enhance water quality necessary to protect existing beneficial uses.

Oregon's nonpoint source management plan requires the BLM to continue coordination with the Oregon Department of Environmental Quality for implementation of best management practices which protect the beneficial uses of water (see appendix G for a list of best management practices). The state of Oregon, through administrative rules (OAR), has identified beneficial uses and applicable water quality criteria for the following basins in the planning area: Sandy (OAR 340-41-482 and OAR 340-41-485), North Coast (OAR 340-41-202 and OAR 340-41-205), Mid Coast (OAR 340-41-242 and OAR 340-41-245), and Willamette (OAR 340-41-442 and OAR 340-41-445). Policy and guidelines, including anti-degradation, generally applicable to all basins are listed in OAR 340-41-026(1)(A).

Management activities would be planned consistent with Oregon's adopted *Oregon Water Management Plan* (Oregon Water Resources Commission 1990) for forest practices and with Oregon's water quality criteria and guidelines (OAR 340-41). Best management practices would be selected based on site-

specific conditions, feasibility, and the water quality criteria for waters potentially affected. Activities would be regulated to protect water quality.

Degradation of water quality would not be permitted if it affects established beneficial uses of water within designated segments of national wild and scenic rivers.

Flood plains and wetlands would be protected in accordance with Executive Orders 11988 and 11990. In accordance with the *Riparian-Wetlands Initiative for the 1990s* (U.S. Department of the Interior, BLM, WO 1991), management would emphasize restoration and maintenance of riparian-wetland areas, protection of riparian-wetland areas and associated uplands, and partnership and cooperative restoration and management of riparian-wetland areas. Riparian zones lacking mature conifers would be managed to achieve at least 75 percent of the site-specific native plant composition.

The management goal in watersheds providing surface water to municipal public water systems would be to provide treatable water at the system's point of intake. Treatable water is water capable of being treated with commonly used filtration and chlorination systems.

Best management practices are grouped in three categories:

- Practices on Timber Production Capability Classification fragile, unsuitable sites;
- Practices on upland management areas; and
- Practices in riparian management areas. The practices which the BLM is committed to implementing regardless of the alternative selected are listed in appendix G.

Part of the rationale for special practices on Timber Production Capability Classification fragile unsuitable woodland sites is to avoid accelerated erosion and transport of sediments to streams and other water. Many of these sites would be avoided during all management activities. Some may need to be disturbed if, for example, they are in the middle of timber harvest units. If so, special practices would be used to minimize disturbance.

Practices on upland areas (i.e., all areas other than Timber Production Capability Classification fragile unsuitable woodland sites and riparian management areas) are intended to minimize erosion and sediment transport. In most cases avoidance of sites is not necessary. However, special design features or mitigating measures may be required.

Riparian management areas would be allocated on each side of all perennial streams, lakes, ponds, wetlands and other waters. The purposes of riparian management areas are to minimize damage to riparian vegetation and disturbance of banks, to maintain or achieve at least 75 percent of site-specific native riparian vegetation that support water-related functions, to protect the natural flow of water, and to maintain and achieve natural levels of woody debris. This would be achievable in all alternatives except A. Actual riparian management area widths would be delineated by interdisciplinary teams and determined by on-the-ground riparian vegetation, terrain and other relevant factors. However, they would be a minimum of 50 feet on all third order and larger perennial streams and other water. First and second order streams would have riparian management areas (minimum of 50 feet) designated if perennial or if the beneficial uses warrant. In all cases the riparian management areas would be wide enough to maintain water temperatures (less than one degree Fahrenheit increase) and filter upland sediments. During timber harvest involving intermittent streams without riparian management areas, shrubs and nonmerchantable trees would be retained in a strip averaging 25 feet wide on each side of stream channels. Slope breaks would also be used to provide protection for stream channel and bank integrity and to filter upland sediments.

The basic management constraints in riparian management areas would be:

- Timber harvest would not be planned within riparian management areas. However, some tree cutting or timber harvest activities could occur to achieve resource management objectives. These activities may include road construction and yarding corridors to facilitate timber harvest outside the riparian management area, or wildlife and fish habitat improvement projects. All activities would be designed to minimize degradation of water quality (see appendix G for a list of best management practices).
- Off-highway vehicle use in riparian management areas would be limited to existing roads and trails. (This constraint is not part of the no action alternative).
- Riparian management areas would be open to locatable mineral development with restrictions to protect water quality. Mineral leasing would be allowed, but a no surface occupancy stipulation would be included in all leases. Riparian management areas would be closed to saleable mineral development. (This constraint is not part of the no action alternative).

A list of management constraints in riparian management areas is found in appendix G.

Agreements may be pursued with private landowners and other land management agencies for certain riparian areas within the district to help minimize impacts from management activities.

Analysis of cumulative effects by selected analytical watershed may guide overall activity scheduling during the life of the plan (see the discussions of Requirement for Further Environmental Analysis and Use of the Completed Plan, later in this chapter). If a proposed activity lies outside the selected analytical watersheds addressed in this environmental impact statement, a similar cumulative effects analysis would be completed during project planning. Direct, indirect and cumulative effects on water would be analyzed for an appropriate-sized watershed. The analysis would determine whether implementation of standard best management practices is sufficient to meet Oregon water quality criteria. Proposed activities that may violate these criteria would be modified to mitigate the effects on water quality. They may also be deferred until activities could be conducted in compliance with the requirements.

Timber

Land categories allocated for intensive management of forest products are shown in figure 2-2. Under all alternatives, lands allocated to timber production are considered capable of being reforested within five years after harvest without irreversible resource damage.

Transportation System

New roads would be kept to the minimum needed for access to regeneration harvest units or management of other resources. Permanent roads would not be constructed solely to access commercial thinning areas. They would be located, designed, and constructed to standards appropriate to the expected road use and the resource values affected. Construction standards for stream crossings, subgrade widths, ditches, cut-and-fill slopes, type of surfacing, etc., would be determined during site-specific planning.

Timber Harvest

On lands allocated primarily for timber production, the regeneration harvest method most commonly employed would be clearcutting, except in alternative C and the preferred alternative. Under alternative C and

the preferred alternative, timber harvest would be a series of partial cuts. Snags and several wildlife trees per acre would be retained.

Logging systems would be designed to minimize soil damage and to protect watersheds. For specific design features, see BLM Manual supplement H-5420-1, *Timber Production Capability Classification* (U.S. Department of the Interior, BLM, OSO 1990a). Timber harvest would be accomplished by a mix of aerial, cable, or ground yarding systems. When aerial or cable systems are used, one or both ends of the logs would be suspended above the ground for all or part of their length during most of the yarding operation. Appendix K describes timber harvest methods and silvicultural systems.

In timber sales involving ground yarding systems, existing skid trails would be used as much as possible. Generally, new skid trails would be limited to slopes less than 35 percent. Tractor operation on skid trails would generally be limited to periods of low soil moisture content when resistance to soil compaction is greater. Operators would be required to minimize the extent of soil displacement during logging. At the time of regeneration harvest, compacted areas would be tilled with a properly designed self-drafting winged subsoiler. For entries other than regeneration harvest, skid trails would be selectively tilled with the same equipment to avoid root damage to reserved trees.

Where clearcutting is used, harvest units would generally range from 10 to 40 acres in size. In some cases, they may be 100 acres or more. Large clearcuts would permit economical and effective logging, site preparation, or salvage of damaged timber. They would also reduce forest fragmentation.

Mortality salvage would occur to the extent consistent with resource management objectives.

Managed timber stands would be commercially thinned to increase timber production or achieve other management objectives. The interval of treatment would generally range from 20 to 40 years.

Unless harvest would be inconsistent with other plan guidelines, trees could be harvested from land not available for timber production for the following reasons:

- design more logical management units, reduce road construction, or lessen net adverse environmental impacts on small areas of Timber Production Capability Classification nonsuitable woodland located within a harvest unit;

- salvage trees or stands killed or substantially damaged by fire, disease, insects, or wind;
- control the spread of insect or disease outbreaks;
- conduct experiments;
- provide for the safety of forest users which includes hazard tree removal in camp and picnic areas, administrative sites, and along trails and roads open to public travel;
- maintain or enhance fish and wildlife habitats;
- improve visual resources by opening scenic vistas;
- provide guyline or tailhold trees where needed to facilitate logging on adjacent lands;
- construct new facilities such as roads, trails, power lines, communication facilities, administrative facilities, and recreation facilities; and
- reduce interference with the operation of microwave relay stations.

Site Preparation

Four types of site preparation treatments would be used: prescribed fire, mechanical clearing and piling, manual treatment, and herbicide application. BLM's program for management of competing vegetation (U.S. Department of the Interior, BLM, OSO 1992) and manual supplement H-5420-1 (U.S. Department of the Interior, BLM, OSO 1990a) would be followed in selecting site preparation treatments. Emphasis would be placed on treatments proven most effective in assuring seedling survival and growth and in maintaining long-term productivity of the soil resource.

Prevention is the preferred strategy for controlling competing vegetation within harvest units, before and after the unit has been replanted. The goal is to prevent or reduce the need for future vegetation control treatments by considering known ecological relationships. Timber harvest activities would be designed to reduce the probability that vegetation control treatments would be needed after harvest.

Prescribed fire would be the primary means of site preparation. All burning would be conducted according to prescriptions designed to achieve the following goals:

- control competing vegetation;
- reduce slash to improve plantability and reduce fire hazard;
- protect the physical and chemical properties of the soil, including organic matter content, nutrients, and microorganisms; and
- maintain air quality in designated areas.

Prescribed fire would be avoided on soils recognized as unusually erodible, nutrient deficient, or low in organic matter. On other soils, prescriptions would be designed to protect beneficial soil properties by emphasizing prescribed fires of moderate and low intensity. Burning would generally be conducted when large fuels are moist and small fuels are dry. Under these conditions a fire goes out quickly. Standard operating procedures for prescribed fire are found in the 1992 vegetation management record of decision.

Mechanical site preparation would consist of piling or windrowing of slash and brush. The following conditions would apply:

- Minimize piling of large woody material;
- Avoid displacing duff layers and topsoil into piles or windrows;
- Limit tractor operation to one round trip over the same area; and
- Operate only when soil moisture content is below specified levels, to minimize soil compaction. Track-type equipment with a brush blade would be restricted to areas with suitable soil types and slopes less than 35 percent.

Low-ground-pressure backhoes, loaders, grapples or other special equipment that would cause insignificant soil compaction impacts may be used instead of track-type equipment, especially on steeper slopes and more fragile soils. Compacted areas would be tilled with approved, rear-mounted winged subsoiler equipment.

Manual site preparation would consist of brush pulling, brush cutting, hand piling of slash for burning, and hand scattering of slash to increase site plantability.

Herbicides would be used where appropriate, prior to tree planting to control grasses, forbs, brush and noncommercial tree species, and to increase the rate of tree seedling survival. The application and monitoring of herbicides would be carried out in accordance with the 1992 vegetation management record of decision.

Herbicides would be applied aerially and by several ground methods, as appropriate to site-specific conditions. The method selected would depend on costs, topography, equipment limitations, target plant species and dispersion, potential environmental impacts, and biological conditions. Aerial applications of herbicides would be done by helicopters equipped with systems designed to limit herbicide application to the targeted spray areas.

Timing of herbicide treatment would be stringently controlled in relation to specified weather conditions such as temperature, humidity, and wind. Continuous BLM contract administration of spraying operations would be required. Operations would be discontinued when field conditions are not within acceptable limits. Equipment and operators would be checked frequently by field project inspectors. Only registered chemicals would be used and in accordance with label instructions on containers. Handling, storage, and application of chemicals would be in accordance with the Oregon Forest Practices rules.

Brush and Hardwood Conversion

Some lands growing primarily brush or hardwoods would be converted to appropriate conifer species. The conversion may include harvest of existing merchantable trees, cutting of unmerchantable trees and brush, application of herbicides, and broadcast burning prior to replanting with conifer seedlings. Conversion proposals would be subject to interdisciplinary team review.

Planting

Seedlings would be planted when feasible during the first winter following completion of harvesting and site preparation operations. Indigenous conifer species such as Douglas-fir, western hemlock, western redcedar, noble fir, western white pine, sugar pine, and grand fir would be planted. Sites not suitable for conifers would be managed for production of hardwood species. Identified root disease centers would be planted with tree species resistant to the disease.

Planting stock would be nursery-grown trees from seed collected within the same seed zone and elevation band as the specific project areas. Except under alternative C, genetically-selected planting stock would be used as available to replant harvested acres in accordance with *An Updated Tree Improvement Plan for Western Oregon* (U.S. Department of the Interior, BLM, OSO 1987a). Under alternative C, genetically-selected stock would be used on no more than 50 percent of the acreage. Broad selection of parent trees for such stock will maintain genetic diversity. For a more complete description of the tree improvement program, see appendix L.

For alternatives no action, A, B, D, and E, the spacing of trees in forest plantations would be designed to maximize wood production by concentrating site resources on growth of individual trees with desired characteristics. Desired spacing would be achieved by initial planting spacing, precommercial thinning, and commercial thinning.

Desired stocking levels cannot always be achieved by initial plantings. Post-treatment reforestation surveys would be conducted to determine the rate of seedling survival and to identify what areas should be replanted or interplanted to meet established stocking standards.

Plantation Protection

Plantation protection treatments would include:

- Placing plastic tubing or netting over the seedlings or by putting paper caps over the growing tips as protection from browsing and clipping damage by deer, elk, mountain beaver or other animals;
- Trapping mountain beaver and gophers when large concentrations of the animals threaten survival of sections of a plantation; and
- Establishment of seasonal bear feeding stations at selected locations, special hunting seasons, and, on rare occasions, snaring and destroying of selected animals to reduce black bear damage. The number of acres requiring each of these treatments would be determined annually in conjunction with normal reforestation surveys.

Plantation Maintenance and Release

Maintenance and release treatments would be used to manage competing vegetation in young plantations. Maintenance treatments are those which promote survival and establishment of seedlings during the first few years after planting. Release treatments are applied to plantations of established trees to promote dominance and growth of the desired trees by reducing competition from hardwoods or brush.

When competition is reduced by vegetation management treatments, conifer seedlings are generally able to grow rapidly beyond the point where they can be overtopped and suppressed by surrounding vegetation. Once this condition is achieved (approximately 3 to 10 years after planting), no further effort to manage competing vegetation would be necessary.

All available methods would be considered in selection of maintenance and release treatments. Manual treatment, in which brush and hardwoods are cleared from around desired crop trees using power saws or hand tools, would be the primary method of managing competing vegetation. Herbicides would be used to manage competing vegetation only when analysis shows herbicide treatment to be the most appropriate, and when other methods of vegetation management would be relatively ineffective or unreasonably expensive.

For further details on herbicide use see the previous discussion under site preparation.

Precommercial Thinning

In most situations, precommercial thinning would be applied to timber stands between 10 and 15 years of age that contain over 450 trees per acre. This treatment allows available nutrients, moisture and light to reach those trees which would be the eventual crop for future harvest.

The number of trees remaining after precommercial thinning is dependent on the prescription for the forest stand and the density of the stand before thinning. The prescribed average spacing of crop trees would usually range from 12 to 16 feet, and the number of trees left may vary from 170 to 300 per acre.

Fertilization

Areas precommercially or commercially thinned and other areas in which stand density is in the desired range would be considered for fertilization, particularly where other indicators suggest growth is limited by lack of nitrogen. Fertilization permits faster development of larger trees and shorter intervals between commercial thinning entries by accelerating tree growth for up to ten years following treatment.

Pruning

Pruning would be applied to selected young forest stands. This treatment can significantly increase the value of harvested timber. It reduces the proportion of juvenile wood in the tree and the number of knots caused by branches. The lower branches of the identified crop trees would usually be pruned to a height of approximately 18 feet.

Minor Forest Products

Extraction of minor forest products such as firewood, cedar shake bolts, mushrooms, ferns, and floral greens would be accommodated on lands available for such harvest to the extent consistent with resource objectives. Copies of Department of Environmental Quality publications that promote burning of dry wood would be made available.

Special Status Species Habitat Including Threatened and Endangered Species

As required by law, habitats of federally listed or proposed threatened or endangered species would be protected, monitored and managed. Prior to any vegetative or ground manipulation or any disposal of BLM-administered land, a review of the affected site or tract(s) would be conducted for special status plants and animals.

If a project may affect a federally listed threatened or endangered species or its critical habitat, an effort would be made to modify or relocate the project to achieve a no effect determination as defined by the Endangered Species Act. When the BLM determines that such a project cannot be altered to avoid the potential effect and abandonment of the project is not considered appropriate, consultation with the U.S. Fish and Wildlife Service would be initiated.

All actions would be consistent with the bald eagle recovery plan (U.S. Department of the Interior, Fish and Wildlife Service 1986). The following known and potential habitat sites identified in the bald eagle recovery implementation plan (Washington Department of Wildlife 1989) would be protected: Raymond Creek, Table Mountain, Elk Creek, Green Peter Peninsula, North Santiam, North Fork Siletz River, Kilchis River, and Willson River. Habitat management plans would be written and implemented incorporating the BLM-responsible actions identified in the implementation plan. The habitat management plans would be reviewed periodically by the BLM and U.S. Fish and Wildlife Service to determine whether modifications are needed.

Actions would also be consistent with the *Pacific Coast Recovery Plan for the American Peregrine Falcon* (U.S. Department of the Interior, Fish and

Wildlife Service 1982). (The current plan does not list any known or potential habitat on BLM-administered lands in the district).

Systematic inventories and studies would be conducted on special status species where baseline information is currently lacking.

Wildlife and Fish Habitat

Nonmerchantable down, dead woody material would be retained on areas from which timber is harvested to the extent compatible with reforestation, fire hazard reduction, and watershed protection objectives. Gross yarding would be planned only where required to meet the objectives stated above. Salvage of down, dead woody material would be conducted only where an adequate amount of such material would be retained to provide habitat diversity.

At a minimum, snags would be retained as nonmerchantable material in timber harvest units. They would also be retained on lands not allocated to timber production. Some snags may be removed from areas where public safety is a concern. Where relevant to meeting cavity-nester objectives, some green trees on lands not allocated to timber production would be girdled or topped to create snags. Timber sale contracts would include stipulations to retain all snags and nonmerchantable trees that can be left safely in timber harvest units. In alternatives providing for retention of wildlife trees, green trees would be retained to provide habitat for cavity users and a source of future snags. If nonmerchantable trees are unavailable, merchantable trees would be retained for this purpose.

Wherever practical, roads would not be constructed in areas with high wildlife values, such as active nesting or breeding sites, and protected old-growth forest blocks. Some spur roads unneeded for continued timber management may be closed and rehabilitated upon completion of logging and reforestation activities. Other existing BLM roads in areas with high wildlife values would be closed to general public travel. However, they could remain open for administrative use, forest product removal, and access for mineral exploration and development. Under all alternatives except no action, the following elk habitat areas would be closed: Alsea Falls vicinity (700 acres), Bummer Ridge (2,100 acres), Clarence Creek area (300 acres), Elk Creek/Bear Creek area (2,200 acres), Dead Horse Canyon (1,600 acres), East Creek (800 acres), Fall Creek (2,600 acres), Fan Creek (1,000 acres), Little North Fork Wilson River

area (500 acres), Skunk Creek (700 acres) and Tillamook Ridge (700 acres). The Homestead Road area (1,700 acres) would be seasonally limited, and only designated roads and trails would be open in the North Fork Siletz River area (6,400 acres) and on Green Peter Peninsula (1,900 acres).

Major game trails would be kept clear of slash accumulations caused by precommercial thinning projects.

Special habitats, such as talus slopes and meadows, with significant values would be managed to protect their primary habitat values. Interdisciplinary team review would be conducted on a site-by-site basis to assess the significance of special habitats.

Under all alternatives, forage seeding would be conducted in timber harvest units with appropriate seed beds and where compatible with continued timber production.

When practical, timber sale contracts would require addition of large woody debris in designated, cross-stream log yarding corridors. They would also require altering of log jams blocking fish passage. All debris in active stream channels of perennial and intermittent streams and other water would be retained. Culverts would be installed to facilitate fish passage.

Consistent with the BLM's nationwide *Fish and Wildlife 2000 - A Plan for the Future* (U.S. Department of the Interior, BLM, WO 1989), the fisheries potential of anadromous fish streams would be enhanced. Most uncompleted fish habitat improvement projects identified in *A Five-Year Comprehensive Anadromous Fish Habitat Enhancement Plan for Oregon Coastal Rivers* (U.S. Department of the Interior, BLM, OSO 1985a) would be completed. A number of other potential projects have been identified where significant, correctable limiting factors exist. For riparian management direction related to wildlife and fish habitat, see the previous Water Quality and Riparian Zones sections.

Special Areas

Existing special areas selected for continued management as special areas would be administered generally in accordance with existing guidelines (i.e., approved site-specific management plans or guidelines equivalent to those in the management framework plans). Management plans would be written or updated as needed.

Some candidate areas of critical environmental concern were dropped from area of critical environmental concern consideration through interdisciplinary team analysis because they did not meet BLM eligibility criteria. These areas would be managed according to the alternative selected.

Recreation

Most BLM-administered lands in the planning area would be designated as extensive recreation management areas. These lands would provide resource-dependent, dispersed recreation opportunities. These opportunities include pleasure driving, hunting, fishing, sightseeing, horseback riding, hiking, mountain biking, and rafting. Recreation opportunities accessible by motorized vehicle and close to population centers would also be emphasized. All BLM-administered lands would be open to recreational mineral collection (casual use) unless subject to prior rights, such as mining claims.

The following existing recreation facilities and areas would be maintained and managed:

- Fishermen's Bend Recreation Site - 38 family camping units, three group camping areas, three group picnicking areas with shelters, family picnicking units, and a boat ramp with a vehicle/trailer parking area.
- Wildwood Recreation Site - 62 family picnicking units, two group picnicking areas with shelters, eight group picnicking units, and a wilderness trailhead with a vehicle parking area.
- Boulder Ridge Trail - 2 miles of developed trail extending to the Salmon-Huckleberry Wilderness.
- Table Rock Trail - 16 miles of developed trail within Table Rock Wilderness.
- South Fork Alsea River Back Country Byway - 11 miles of improved access road.
- Nestucca River Back Country Byway - 11 miles of improved access road.
- Recreation sites and areas managed by other agencies under Recreation and Public Purpose Act lease - six sites and two areas.

Two road segments along the Molalla River and Quartzville Creek would be dedicated as new national back country byways. The Nestucca River Back Country Byway would be extended to include county roads.

Off-highway vehicle use on BLM-administered lands would be regulated to minimize adverse impacts to resource values, conflicts between visitors, and to promote public safety (Executive Orders 11644 and 11989, and 43 Code of Federal Regulations 8340).

Recreation program emphasis would be placed on:

- installing interpretive and informational signs and distributing maps to support state and local strategies for encouraging tourism;
- accomplishing the goals and objectives of *Recreation 2000: A Strategic Plan* (U.S. Department of the Interior, BLM, WO 1989a); and
- accomplishing the goals and objectives of BLM's Oregon-Washington special recreation management area and extensive recreation management area initiatives (U.S. Department of the Interior, BLM, OSC 1989b).

Wild and Scenic Rivers

BLM-administered land adjacent to and within approximately one-quarter mile on each side of four congressionally designated wild and scenic rivers (the Sandy, Salmon, and Clackamas rivers and Quartzville Creek) would be managed to protect and, to the extent possible, enhance the outstandingly remarkable values for which they are specifically noted. Specific management plans have been developed for each river to implement the requirements of the Wild and Scenic Rivers Act of 1968, as amended. Management guidelines and standards for national wild and scenic rivers are described in appendix J.

The BLM's interim wild and scenic river management policy would remain in effect for rivers found suitable and eligible rivers with suitability not determined, pending congressional resolution of the designation issue. Under this interim protective management, no actions adversely affecting outstandingly remarkable values would be authorized on BLM-administered lands within one-quarter mile on each side of the river segments. The management guidelines and standards described in appendix J also apply to rivers under such interim management. For river segments found not suitable through the resource management plan process, interim management would cease upon completion of the record of decision.

River segments with recreational river area as the highest tentative classification that are found suitable or those found eligible with no suitability assessment would be subject to interim management. Interim

management includes no planned timber harvest on BLM-administered lands in the riparian management area and protection of identified outstandingly remarkable values. River segments with scenic river area as the highest tentative classification that are found suitable or those eligible with no suitability assessment would be subject to interim management. This includes no planned timber harvest on BLM-administered land in riparian management areas, application of visual resource management class II guidelines in the one-quarter mile (each side) zone, and protection of identified outstandingly remarkable values. Under alternatives D and E, the suitable river segment with wild river area as the highest tentative classification would be subject to interim management. This includes no planned timber harvest and no other resource-disturbing activities on BLM-administered lands within the one-quarter mile (each side) zone. These management prescriptions are based partly on management direction that addresses other issues such as riparian areas.

Wilderness

The Table Rock Wilderness would be managed in accordance with the approved management plan.

The BLM's Wilderness Interim Management Policy would be followed in management of the Little Sink Instant Study Area, until Congress acts to designate or release the area. No actions diminishing the suitability of the area for wilderness management would be authorized until Congress acts. If Congress decides not to designate the area as a wilderness, it would be protected as an area of critical environmental concern/research natural area under all alternatives except A (see alternative A, Wilderness, for management guidance if that option were selected).

Visual Resources

Visual resource management classes and objectives are as follows:

- Class I - Preserve the existing character of the landscape. This class provides for natural ecological changes. However, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- Class II - Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes

should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- Class III - Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class IV - Allow management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities. This would be done through careful location, minimal disturbance and repeating the basic elements found in the predominant natural features of the characteristic landscape.

In visual resource management class II areas, management activities would be planned and designed to meet the objective of this class. Examples of how a timber sale could be planned and designed to meet the objective are:

- extend the rotation length so less timber would be harvested in a given time;
- selectively cut trees;
- design regeneration harvest to mimic natural openings;
- dispose of debris, seed disturbed areas with grass and forbs, fertilize seeded areas, and replant with large nursery stock; and
- leave trees in selected areas to block views of harvest units.

Similar techniques could be used with other management activities.

In visual resource management class III areas, management activities would also be planned to achieve the objectives of this class. Examples of how timber sales in certain high visual impact situations could be planned and designed to meet the objective are:

- selectively cut trees;
- design regeneration harvest to mimic natural openings;

- dispose of debris, seed disturbed areas with grass and forbs, fertilize disturbed areas, and plant large nursery stock; and
- leave some trees to block views of harvested units.

Timber would be harvested at the usual rate in visual resource management class III areas. Similar constraints would be used in planning other resource management activities in visual resource management class III areas. No specific visual management constraints would apply to lands managed for visual resource management class IV objectives. However, mitigation of visual impacts would be incorporated where consistent with efficient timber harvest or other management activities.

Cultural Resources Including American Indian Values

The 1988 Archeological Resources Protection Act amends direct federal agencies to inventory and evaluate their cultural resources. They are also directed to develop public awareness programs to explain the significance of those resources. One method of meeting the directives is the BLM's cultural resources initiative, *Adventures in the Past* (U.S. Department of the Interior, BLM 1990). The initiative is intended to enhance public enjoyment and awareness of cultural resources. It also features a new Heritage Education program. This program, when implemented, would incorporate the BLM's cultural resources materials into school curriculums for math, science and communications. In addition, 36 Code of Federal Regulations 800 requires that authorized land use actions not inadvertently harm or destroy federal or nonfederal cultural resources. The 36 Code of Federal Regulations 800 also includes affirmative measures to protect and enhance cultural resources. These directives and the initiative would be accomplished by the BLM Salem District through the following measures:

- systematic inventory of areas likely to contain cultural resources;
- systematic testing and evaluation of archaeological sites to assess their potential for contributing to public and scientific uses;
- development of cultural resource management plans for areas with fragile resources or a record of intensive prehistoric or historic use: possible planning areas - Yaquina Head Outstanding Natural Area and the Molalla River corridor;

- development of long-term inventory strategy plans for BLM-administered lands near Scappoose, Oregon, and the physiographic provinces of the Coast Range and western Cascade Range;
- acquisition of significant cultural resource properties for conservation and scientific purposes;
- monitoring by law enforcement personnel of cultural resources being impacted by unauthorized use;
- as part of BLM's Adventures in the Past Initiative, interpretation of cultural resources to increase public awareness and appreciation of the resource values, including material and data from sites 35LNC62 and 35LNC50 and the Yaquina Head Outstanding Natural Area, preparation of written material for sites 35CL25, 35CL34 and 35CL41 in the Table Rock area and interpretation of historic themes at Wildwood Recreation Site;
- implementation of physical protection measures, such as riprapping and barrier installations, to reduce deterioration; and
- development of educational materials and programs as part of the Heritage Education initiative.

Implementation of these measures would depend upon funding and may change as new data is accumulated.

Land Tenure

Exchanges would be made only to enhance public resource values and/or improve land patterns and management efficiency of private and BLM-administered lands within the planning area.

All land tenure adjustments would consider the effect on the mineral estate. If the lands are not known to have mineral potential, then the mineral interest would normally be transferred simultaneously with the surface interest.

The land ownership adjustment criteria listed in appendix O would be considered in land reports and environmental assessments prepared for specific adjustment proposals.

Transfer to other public agencies would be considered where consistent with public land management policy and where improved management efficiency would result. Minor adjustments involving sales or exchanges may be made based on site-specific application of the land ownership adjustment criteria.

Land to be acquired by the BLM through exchanges generally must meet at least one of the following objectives:

- facilitate access to public lands and resources;
- maintain or enhance important public values and uses;
- maintain or enhance local social and economic values in public ownership; and
- facilitate implementation of other aspects of the approved resource management plan.

Land tenure adjustment would be guided by a three-zone concept using the following standards:

- Zone 1 includes lands and other areas identified as having high public resource values. The natural resource values may require protection by federal law, executive order or policy. These lands may have other values or natural systems which merit long-term public ownership. They do not meet the criteria for sale under Federal Land Policy and Management Act section 203(a) and would generally be retained in public ownership.
- Zone 2 includes lands that meet criteria for exchange because they form discontinuous ownership patterns, are relatively inefficient to manage, and may not be accessible to the general public. These BLM-administered lands may be blocked up in exchange for other lands in zones 1 or 2, transferred to other public agencies, or given some form of cooperative management. These lands would not be sold under section 203(a).
- Zone 3 includes lands that are scattered and isolated with no known unique resource values. Zone 3 lands would be available for use in exchanges for inholdings in zone 1 (high priority) or zone 2 (moderate priority). They are also potentially suitable for disposal through sale under Federal Land Policy and Management Act section 203(a). This would occur only if important recreation, wildlife, watershed, threatened or endangered species habitat and/or cultural values are not identified during disposal clearance reviews and no viable exchange proposals for them can be identified. Zone 3 lands would also be available for conveyance to another agency or to local governments, as needed to accommodate community expansion and other public purposes. Transfer to another federal agency to fulfill a specific management objective would also be permitted in zone 3.

Lands in the three zones would be the same in all alternatives as shown on map 2-8. Acres in each are as follows:

Zone	O&C	P.D.	Total
1	129,700	30,500	160,200
2	209,900	18,100	228,000
3	4,700	5,200	9,900
	344,300	53,800	398,100

O&C = Oregon and California lands

P.D. = Public Domain lands

Zone 3 tracts are listed in appendix N.

Sales of BLM-administered lands are conducted under the authority of Federal Land Policy and Management Act section 203. It requires that at least one of the following conditions exist before land is offered for sale:

- The tract, because of its location or other characteristics, is difficult or uneconomical to manage as part of BLM-administered lands and is not suitable for management by another federal department or agency.
- The tract was acquired for a specific purpose and is no longer required for any federal purpose.
- Disposal of the tract would serve important BLM objectives. These include but are not limited to, expansion of communities and economic development, which cannot be achieved prudently or feasibly on land other than BLM-administered land and which outweigh other public objectives and values, including, but not limited to, recreation and scenic values, which would be served by maintaining such tract in federal ownership.

Rights-of-Way

BLM-administered lands would continue to be available for needed rights-of-way where consistent with local comprehensive plans and Oregon's statewide planning goals and rules. Applicants would be encouraged to locate new facilities adjacent to existing facilities to the extent technically and economically feasible. New electric transmission facilities would be allowed in previously designated corridors (see map 2-9). Corridor widths vary depending on the number of parallel facilities. However, they are a minimum of 2,000 feet (1,000 feet either side of existing centerlines) unless constrained by exclusion areas described below. New communications facilities would be allowed on existing communication sites (see map 2-9). New facilities proposed for areas outside designated corridors or existing sites would require plan amendments. In addition to electric

transmission and communication facilities, this requirement would apply to pipelines 10 inches or larger, railroads, communication lines for interstate use, federal and state highways and major county roads.

Prior to BLM approval of a right-of-way, an applicant must submit plans, maps and other information related to the use of the proposal. Each right-of-way would be limited to the area necessary for operation and maintenance. Approvals would consider public safety, be consistent with the resource management plan and minimize damage to the environment.

All research natural areas, Yaquina Head Area of Critical Environmental Concern/Outstanding Natural Area, Elkhorn Creek (found suitable under alternatives D and E as a wild river area), and Table Rock Wilderness would be considered rights-of-way exclusion areas. Future rights-of-way may be granted only when mandated by law.

Avoidance areas would include the following:

- all existing and potential recreation sites;
- special areas other than research natural areas;
- river segments with scenic river area as the highest tentative classification and found suitable; and
- areas identified as having threatened or endangered, proposed, candidate (category 1 or 2), state-listed or bureau sensitive plant or animal species.

In avoidance areas, future rights-of-way may be granted only when no feasible alternative route or designated right-of-way corridor is available. Areas identified for visual resource management class II management would be avoided or appropriate mitigation measures would be required to minimize adverse visual impacts.

The *Northwest Conservation and Electric Power Plan* (Northwest Power Planning Council 1988) prohibits additional hydroelectric development on rivers and streams with significant fisheries and wildlife resource values. The BLM will not authorize new rights-of-way for hydroelectric development on any streams listed now or in the future by the Northwest Power Planning Council.

Access

Road easements for administrative and timber harvest purposes would be acquired where needed to support timber management or other programs.

Where long-term easements are obtained, an attempt would be made to negotiate public access rights. Opportunities to negotiate such rights, in conjunction with existing reciprocal right-of-way agreements, would also be attempted.

Access to lands often requires mutual access agreements because BLM-administered and private lands generally are intermingled in the planning area. This is usually accomplished through reciprocal right-of-way agreements with private landowners or through federal ownership and control of roads.

Reciprocal right-of-way agreements identify conditions of use that are equitable and nondiscriminatory and facilitate management of the road network. Most of the lands where logging road right-of-way agreements are appropriate are covered by reciprocal agreements. The 75 individual agreements and 25 cooperative agreements with the state of Oregon are subject to the regulations in effect when they were executed or assigned.

The provisions of these agreements allow the BLM only limited discretion to control the location of roads constructed by private parties across BLM-administered lands (and vice versa). This limited discretion allows the BLM to object for only one environmental reason - excessive erosion damage.

Withdrawals

Table 2-7 shows existing land withdrawals. It indicates those which have been recommended for retention or revocation and the reasons for such actions. Lands returned to BLM multiple use management by termination or revocation of withdrawals would be managed the same as surrounding BLM-administered lands. BLM land classifications are listed in table 2-8. With one exception, the withdrawals on classified lands would be retained under all alternatives. A lease for the J.J. Collins Memorial Park will expire during the expected life of the plan and will be reviewed to determine if it should be extended.

Energy and Minerals

Leasable Minerals

Under alternatives no action and A through E, the BLM-administered area open to mineral leasing would be: oil and gas - 387,400 acres; coal - 11,500 acres; and geothermal - 4,500 acres. Exploration and

development activity on open areas would be subject to standard and special stipulations and lease notices.

Standard oil and gas lease stipulations are displayed in appendix M. A powersite stipulation would be used for any lands within a powersite designation. Special stipulations would be attached to oil and gas leases to provide additional protection for fragile areas or special resource values. The special stipulations include no surface occupancy, controlled surface use, and timing limitations. Under all alternatives, several lease notices would be in effect for lands in the planning area.

Surface occupancy would not be allowed on lands allocated to developed recreation sites, special areas, progeny test sites, the Horning Seed Orchard, visual resource management class I areas, threatened and endangered species habitat sites, etc. Controlled surface use and timing limitation stipulations would be used for these areas. The controlled surface use stipulation is appropriate because there are existing roads in the subject areas, and leasable mineral exploration and development could be conducted using those roads. The criteria whereby these special stipulations can be waived, modified, or exempted are shown in appendix M. Additional site-specific conditions may be added to leases to protect surface resources found during field visits to proposed well locations.

The BLM would provide opportunities for coal and geothermal exploration and development in the areas with potential for occurrence. Geothermal activities are regulated under 43 Code of Federal Regulations 3200. Coal activities are regulated under 43 Code of Federal Regulations 3400. Leases would be issued subject to leasing stipulations.

Lands within incorporated cities are by law closed to oil and gas leasing. Tracts within the planning area affected by this type of closure are located in Salem and Willamina.

Locatable Minerals

Areas not specifically closed to mineral entry would remain open under the mining laws. Mineral exploration and development would continue to be regulated under 43 Code of Federal Regulations 3809 to prevent unnecessary or undue resource degradation. Activities exceeding casual use, but disturbing five acres or less, may proceed 15 days after a notice is filed in the district office.

A notice is screened to determine whether the proposed action might create unnecessary or undue resource degradation. Processing a notice is not a federal action, and there is no formal environmental analysis. Projects disturbing more than five acres or special resource areas require an approved plan of operation before work can begin. Once a plan of operation is filed with the BLM, the proposed action is analyzed and mitigating measures are determined to prevent unnecessary or undue resource degradation. Plans of operation are bonded to ensure that mitigating measures are followed and that reclamation of the disturbed lands is completed.

All surface disturbance from mining operations, whether conducted under a notice or an approved plan of operation, would be reclaimed. For all alternatives, the operating standards shown in appendix M would be implemented.

Salable Minerals

Salable minerals would be made available for other government agencies if requested and if the action is consistent with management direction for protection of other resources. The BLM would issue sales contracts for mineral materials which provide for reclamation of mined lands, pursuant to 43 Code of Federal Regulations 3604 or 3610.

Mineral material permits are considered on a case-by-case basis and issued at the discretion of an area manager. Free use permits are issued to government agencies and to nonprofit organizations pursuant to 43 Code of Federal Regulations 3620. Materials obtained by free use permits may not be bartered or sold. Material sale contracts are valued according to the current appraisal of the fair market value. Agency needs and any private demand would be met from two existing designated community pits or the other 93 quarries in the planning area. New common use areas or community pits would be designated if the level of localized activity warrants.

Rock quarries would also continue to provide rock for construction and maintenance of BLM timber access roads. New quarry sites would be developed as needed if they are consistent with the management direction for protection of other resources. Such development would include the provision for reclamation after the site is depleted of all useable material. Standards for development of salable minerals are shown in appendix M.

Reserved Federal Mineral Estate

The 27,800 acres of reserved federal mineral estate (also referred to as federal subsurface mineral estate) would remain open for mineral development. Leasing would be allowed with no surface occupancy. Locatable and saleable mineral development would be allowed with restrictions determined by the surface owner/administrator. Conveyances of mineral interest owned by the United States, where the surface is, or will be, in nonfederal ownership, may be made to the existing or proposed owner of the surface estate after a determination is made under section 209(b) of the Federal Land Policy and Management Act, finding that:

- there are no known mineral values in the land; or
- the reservation of mineral rights in the United States would interfere with or preclude nonmineral development of the land and that such development is a more beneficial use of the land than mineral development.

Roads

Roads would be constructed and maintained to standards sufficient for their anticipated use. Roads would be sited and constructed to avoid areas of mass soil movement. Where appropriate, roads would be surfaced to minimize movement of sediments. Cut slopes and fill banks would be seeded for stabilization prior to winter rains, where feasible. Temporary roads would be rehabilitated when they are no longer needed. If required to alleviate resource damage, road closures would be implemented, using interdisciplinary team review, public involvement and notification procedures.

Noxious Weeds

Treatment of noxious weeds to control infestations on BLM-administered lands would be designed using an integrated pest management approach. Chemical, manual, mechanical, and biological methods would be considered. Application and monitoring of the effects of herbicides would be done in accordance with BLM's multi-state environmental impact statement, *Northwest Area Noxious Weed Control Program* (U.S. Department of the Interior, BLM, OSO 1985), as supplemented (U.S. Department of the Interior, BLM, OSO 1987). Among the noxious weeds expected to be controlled are tansy ragwort, Canadian thistle, scotch broom, and knapweed.

Hazardous Materials

The transportation, storage and handling of hazardous materials would be according to manufacturers' specifications and applicable laws. These include the Resource Conservation and Recovery Act and the Emergency Planning and Community Right-to-Know Act.

Any release or unauthorized dumping of waste, or abandoned/inactive waste disposal site suspected of involving hazardous materials would be reported, assessed, and treated. This would be done in compliance with the district's *Hazardous Materials Contingency Plan* (U.S. Department of the Interior, BLM, SDO 1993), the Federal Water Pollution Control Act, the Clean Air Act, the Comprehensive Environmental Response, Compensation and Liability Act, and other applicable state and federal environmental laws.

Fire

All BLM prescribed fire activities which affect air quality would be conducted in accordance with the *Oregon State Implementation Plan* (Oregon Department of Environmental Quality 1986), administered by the Department of Environmental Quality, and the *Oregon Smoke Management Plan* (Oregon Department of Forestry 1986), administered by the Department of Forestry. The protection of public land from the impacts of wildfires and the planned application of prescribed fire to meet various resource management objectives would be implemented as part of all alternatives on BLM-administered lands within the planning area.

Wildfire Suppression

Wildfire suppression in the planning area is contracted through the Oregon Department of Forestry. The contract includes all activities associated with wildfire suppression. The primary objective of the contract is prompt detection, attack, and suppression of all wildfires in accordance with the Salem District's resource management objectives. The district provides suppression resources to the Oregon Department of Forestry on a cost-reimbursable basis for any fires which threaten or occur on BLM-administered land in the planning area. The district also maintains qualified resources and personnel for regional and national wildfire suppression by other agencies.

There are two types of wildfire suppression for BLM-administered lands in the planning area - intensive and conditional. Intensive fire suppression occurs when extremely valuable resources are threatened by

fire and no amount of loss is acceptable. Examples include the seed orchard and high-use recreation sites. Conditional fire suppression means the level of fire suppression activity is commensurate with the value of the affected resource. Fires will be aggressively suppressed according to predetermined protection standards outlined in the Western Oregon Protection Contract. The current protection standard is to control 94 percent of all fires at ten acres or less.

The application of prescribed fire is divided into two management strategies:

- Fire use areas - prescribed fire is needed to meet resource management objectives, such as vegetation control and wildlife habitat improvement; and
- Fuels management areas - prescribed fire is required to reduce fuel buildup and lessen the risk of wildfire occurrence. An example would be a high level of fuel in rural interface areas where life and property may be threatened if a wildfire occurs.

Management Direction by Alternative

(Except the Proposed Resource Management Plan)

Introduction

The goals and objectives for alternatives A through E are defined in appendix D. A summary of the land use allocations and management actions for each alternative is found in table 2-1.

No Action Alternative

This alternative projects all land allocations and management actions in the existing plan into the next plan. Some allocations have changed since 1983 due to the Table Rock Wilderness designation, Grand Ronde Indian Reservation transfer, and miscellaneous land sales and exchanges.

Water Quality and Riparian Zones

Protection of water and riparian zones would continue in the following riparian management areas: second order streams with fish and third order and larger streams - riparian zones as mapped in the 1970s or as marked on the ground during project design; lakes, ponds and wetlands (e.g., bogs and marshes) - 200 to 250 feet where possible; spring with diversion - 50 feet if necessary. See table 2-1 for a comparison of allocated riparian management areas by alternative.

Most water, ground and vegetation-disturbing activities would be restricted in the riparian management areas. Allowable activities would include cross-stream log yarding corridors and fish enhancement projects.

Old-Growth and Mature Forest

Approximately 16,900 acres of forest land, allocated as older forest retention areas, would continue to be protected pending additional research on the ecological values of older forest. For a comparison of acres where older forest would be available, see table 2-1. Older forest (120 years and older) in these areas, combined with older forest in other allocated areas (e.g., riparian zones, recreation sites, and special

areas) total approximately 21,300 acres. Of this total, 12,300 acres are old-growth forest, and 9,000 acres are mature forest. By 2002, older forest in these allocated areas would total 22,100 acres.

Timber

Of 329,300 acres of the commercial forest lands, 278,000 acres (84 percent) would be available for intensive management of forest products; 9,900 acres would be available for restricted management of forest products; and 41,400 acres would not be available for management of forest products. See table 2-1 for a comparison of acres available for timber production by alternative.

Special Status Species Habitat

In addition to protection of federally listed and proposed threatened and endangered species, BLM and BLM-permitted activities would be designed to conserve habitat of other special status species (i.e., category 1 and 2 federal candidate, state-listed and bureau sensitive species). For a comparison of acres protected by alternative, see table 2-1.

Other Wildlife Habitat

During timber sale planning, suitable wildlife trees would be identified for retention in numbers equalling or exceeding two snags or unmerchantable green trees per acre. Forage would be seeded on about 400-700 acres per year, and approximately 20 miles of fish habitat would be improved during the expected life of the plan (i.e., the next ten years). For a comparison of habitat work by alternative, see table 2-1.

Special Areas

Twenty existing areas of critical environmental concern and two other special areas would continue to be managed in accordance with site-specific management plans or guidelines similar to those set forth in the 1983 management framework plans. See table 2-1 for the number of sites and acres by alternative.

Recreation

Twelve recreation sites, one special recreation management area, seven hiking/horseback trails (26 miles), and 2,143 miles of BLM-controlled roads would remain open for visitor use and enjoyment. The district would continue to pursue opportunities to develop one potential recreation site and six potential trails identified in the 1983 plans. Approximately

333,700 acres would be open year-round to motorized vehicle use (see table 2-1 for off-highway vehicle designations by alternative).

Wild and Scenic Rivers

No eligible river segments would be found suitable for addition to the National Wild and Scenic Rivers System. See table 2-1 for a comparison of wild and scenic river suitability findings by alternative.

Visual Resources

Acres classified visual resource management classes I through IV in the 1983 plans would continue to be managed according to the standards established in those plans. See table 2-1 for a comparison of visual resource management acres by alternative.

Land Tenure

The district would continue to pursue land sales, exchanges and transfers of jurisdiction as defined in the 1983 plans. Acres to be considered for sale total 91 acres, for exchange 4,400 acres, and for transfer 7,600 acres.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leasables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 68,800 acres; and salables - 379,200 acres. Activity would be restricted in accordance with management objectives of this alternative. For a comparison of mineral restrictions by alternative, see table 2-1.

Rural Interface Areas

There were no specifically identified rural interface areas in 1983. Under the no action alternative, the BLM would continue to take precautions when operating near homes to protect the health and safety of residents.

Alternative A

Water Quality and Riparian Zones

Riparian management areas would be allocated on each side of perennial streams and other waters (see table 2-1). Riparian management areas would average 75 feet (50-foot minimum). This is the minimum average width determined to meet the Department of Environmental Quality's water quality criteria.

Old-Growth and Mature Forest

Lands currently and/or eventually providing old-growth and mature forest habitat would include the following allocations: nonsuitable woodlands, riparian management areas, two high-use recreation sites, Recreation and Public Purpose Act leases, Table Rock Wilderness, and bald eagle nest sites. These lands total 59,900 acres (see table 2-1), of which 6,800 acres are old-growth and 17,100 acres are mature forest.

Timber

In this alternative, 311,000 acres (94 percent) of the commercial forest land would be available for intensive management of forest products and the remaining 18,300 acres would not be available for management of forest products (see table 2-1).

Special Status Species Habitat

In addition to protection of federally listed or proposed threatened and endangered species, BLM and BLM-permitted activities would be designed to protect habitat of category 1 and 2 federal candidate, state-listed and bureau sensitive species where such actions would not diminish commercial use such as timber production (see table 2-1).

Other Wildlife Habitat

About 54 miles of fish habitat would be improved during the expected life of the plan (see table 2-1). See Management Direction Common to Alternatives A through E, Wildlife and Fish Habitat, for a list of elk habitat areas proposed for vehicle closure.

Special Areas

Two existing special areas on nonforest land would be allocated and managed and 20 would be revoked. Although the area of critical environmental concern

for the Elk Creek bald eagle nest area would be revoked, the area would continue to be protected under an existing wildlife habitat management plan. One new area on nonforest land would be designated and managed as a special area (see table 2-1).

Recreation

Two recreation sites would be retained and managed and ten would be converted to their natural setting and available for dispersed recreation opportunities. Two recreation trails would be retained and managed and five would revert to natural conditions. Approximately 331,100 acres would be open year-round to motorized vehicle use (see table 2-1).

Wild and Scenic Rivers

No eligible rivers would be found suitable for addition to the National Wild and Scenic Rivers System.

Wilderness

The 80-acre Little Sink Instant Study Area may not be designated as wilderness by Congress. This would release the area to nonwilderness uses. Under alternative A, part of the area would be protected by nonforest and fragile site classifications and part would be allocated to timber production.

Visual Resources

Lands within existing boundaries designated by Congress for exclusive management would be managed as visual resource management class I. Forest lands available for planned timber harvest would be managed as visual resource management class IV, and the remaining lands would be managed as inventoried (see table 2-1).

Land Tenure

Enhancement of the nondeclining harvest level of commercial forest land managed by the BLM would occur through land exchanges, by improving age class distribution or through other harvest level determination factors. Factors to be considered include site quality, access to public forest land, logical logging units, and management of public forest land to facilitate timber harvest. No exchanges would be made to acquire lands more valuable for non-timber uses. No commercial timberland would be sold or leased. No leases or conveyance of commercial timberland would be made under the Recreation and Public Purposes Act.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leasables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 69,000 acres; and salables - 377,600 acres. Activity would be restricted in accordance with management objectives of this alternative. For a comparison of mineral restrictions by alternative, see table 2-1.

Rural Interface Areas

No special management would be provided.

Alternative B

Water Quality and Riparian Zones

Riparian management areas would be allocated on each side of perennial streams and other waters. The riparian management areas would approximate the actual riparian vegetation zone. The following are expected average widths on each side of perennial water: first through third order streams, 75 feet (50-foot minimum); fourth order, 100 feet; fifth order, 140 feet; sixth order, 160 feet; other waters, such as lakes, 100 feet (see table 2-1).

Old-Growth and Mature Forest

Lands currently and/or eventually providing old-growth and mature forest habitat would include the following allocations: nonsuitable woodlands; riparian management areas; Table Rock Wilderness; 12 developed recreation sites; six potential developed recreation sites on public domain lands; one potential special recreation management area on public domain land; Recreation and Public Purpose Act leases; 22 existing and 4 potential special areas which meet alternative B criteria; and threatened and endangered species recovery areas where timber harvest is prohibited. These forest lands total 67,500 acres, of which 7,700 acres are classified as old-growth forest and 19,500 acres are mature forest.

An additional 36,400 acres would be allocated for provision of older forest seral stages (seral blocks). The seral blocks would be distributed in a corridor system. Large blocks would be about 640 acres in size, and small blocks would be about 80 acres each.

Some of the blocks would incorporate lands excluded from harvest for other purposes as noted in the preceding paragraph. The blocks would not be available for planned timber harvest. Some forest management activities such as thinning in overstocked stands may occur in these blocks to enhance old-growth conditions. Approximately 7,700 forest acres in the seral blocks are classified as old-growth, and 9,500 acres are mature forest. Emphasis on inclusion of public domain lands placed 4,100 acres of such lands within the blocks.

Total forest land allocated to provision of old-growth and mature forest would be 103,900 acres of which 15,400 are old-growth and 29,000 are mature forest (see table 2-1).

Timber

In this alternative, 264,900 acres (80 percent) of the commercial forest land would be allocated for intensive management of forest products; 2,100 acres would be available for restricted management of forest products; and 62,300 acres would be available for enhancement of other uses or not available for management of forest products (see table 2-1).

Special Status Species Habitat

In addition to protection of federally listed or proposed threatened and endangered species, BLM and BLM-permitted activities would be constrained or modified to the extent considered necessary to prevent federal listing of federal candidate (category 1 and 2) species known to occur only on BLM-administered lands.

Actions would also be designed to:

- Protect habitats of category 1 and 2 federal candidate, state-listed and bureau sensitive species on Oregon and California lands where such actions would not diminish commercial use such as timber production; and
- Protect habitats of all such species on public domain lands (see table 2-1). If any of those species are suspected to be present in an area proposed for a specific site-disturbing activity, a field survey would focus on those species.

Other Wildlife Habitat

During timber sale planning, at least three snags and green culls (nonmerchantable trees) per acre would be retained as wildlife trees. Forage would be seeded on 400 to 800 acres per year, and approximately 54 miles of fish habitat would be improved during the expected life of the plan (i.e., the next ten years). For a comparison of habitat work by alternative, see

table 2-1. See Management Direction Common to Alternatives A through E, Wildlife and Fish Habitat, for a list of elk habitat areas proposed for vehicle closure.

Special Areas

Twenty-two existing special areas would be allocated and managed. Three new areas on nonforest lands, nonsuitable woodlands or public domain land and one new area within a high-use recreation site would be designated and managed as special areas (see table 2-1).

Recreation

Twelve recreation sites, two recreation trails and one special recreation management area would be maintained and managed (see table 2-1). Options would be retained for future development of six high-value potential recreation sites and for establishment of one new special recreation management area on public domain lands.

Approximately 319,200 acres would be open year-round to motorized vehicle use (see table 2-1).

Wild and Scenic Rivers

Approximately 28.5 river miles (three segments) would be found suitable for designation as recreational river areas.

Visual Resources

The following lands would be managed as inventoried: available forest land within one-quarter mile of developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the federal Wild and Scenic Rivers Act. All other available forest land would be managed as visual resource management class IV, except as noted under Rural Interface Area management. The remaining lands (i.e., nonforest, nonsuitable woodland, and lands allocated for uses other than timber production) would be managed as inventoried (see table 2-1). The public domain land pattern makes different management of these lands irrelevant from a visual resources standpoint.

Land Tenure

Exchanges of Oregon and California lands would be made primarily to acquire lands to enhance timber management opportunities. Exchanges of public domain lands would occur to benefit one or more of

the resources managed, including nontimber values. Sale of Oregon and California lands other than available commercial forest lands, and of public domain lands, would occur if they met any of the criteria of Federal Land Policy and Management Act section 203(a). Such lands would be leased to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in zones 2 and 3 to provide appropriate facilities or services.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leaseables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 67,600 acres; and salables - 372,300 acres. Activity would be restricted in accordance with management objectives of this alternative (see table 2-1).

Rural Interface Areas

Approximately 3,400 acres of BLM-administered lands within one-quarter-mile of private land in managed rural interface areas (private lands zoned for one to five-acre lots) would be managed as rural interface areas. Of this total, 2,300 acres would be managed for visual resource management class III objectives (see table 2-1). The following alternative timber management practices would be applied on those lands, where feasible and consistent with sustained yield timber management:

- harvest regimes other than clearcutting;
- hand application of herbicides and pesticides;
- extension of riparian management areas to protect domestic water diversions; and
- hand piling of slash for burning.

Alternative C

Water Quality and Riparian Zones

Riparian management areas would be allocated on each side of perennial streams and other waters. The riparian management areas for third order and larger streams would be approximately one-and-a-half times the riparian vegetation zone. The following are expected average widths on each side of perennial water: first and second order streams, 75 feet (50-foot minimum); third order streams, 105 feet; fourth order, 150 feet; fifth order, 210 feet; sixth order, 240 feet; other waters, such as lakes, 150 feet (see table 2-1).

Old-Growth and Mature Forest

Forest lands not subject to planned harvest would include the following allocations: nonsuitable woodlands; suitable woodland-nonsuitable commercial forest land; riparian management areas; Table Rock Wilderness; 12 developed and 12 potential recreation sites; two new special recreation management areas; Recreation and Public Purpose Act leases; 22 existing and 10 potential special areas which meet alternative C criteria; and threatened and endangered species recovery areas where timber harvest is prohibited. These forest lands total 82,200 acres, of which 8,700 acres are old-growth and 21,900 acres are mature forest.

An additional 50,200 acres of forest land would be included in a system of old-growth restoration and retention areas (see figure 2-3). The purpose of this allocation would be to improve biological diversity. Of this land, 9,800 acres are old-growth and 11,500 acres are mature forest.

In restoration and retention areas, density management thinnings would be applied to certain stands to promote development of structural conditions similar to those in older forests. There would be no regeneration harvest other than salvage of extensive mortality. The restoration and retention areas are located throughout the planning area, but are generally centered around the largest existing concentrations of older forest.

The remaining 238,600 acres of forest land would also be managed to improve biological diversity. Two partial stand retention prescriptions would be used on these lands: (1) high retention - retain an average of 35 percent of normal basal area; and (2) low retention - retain an average of 18 percent of normal basal area.

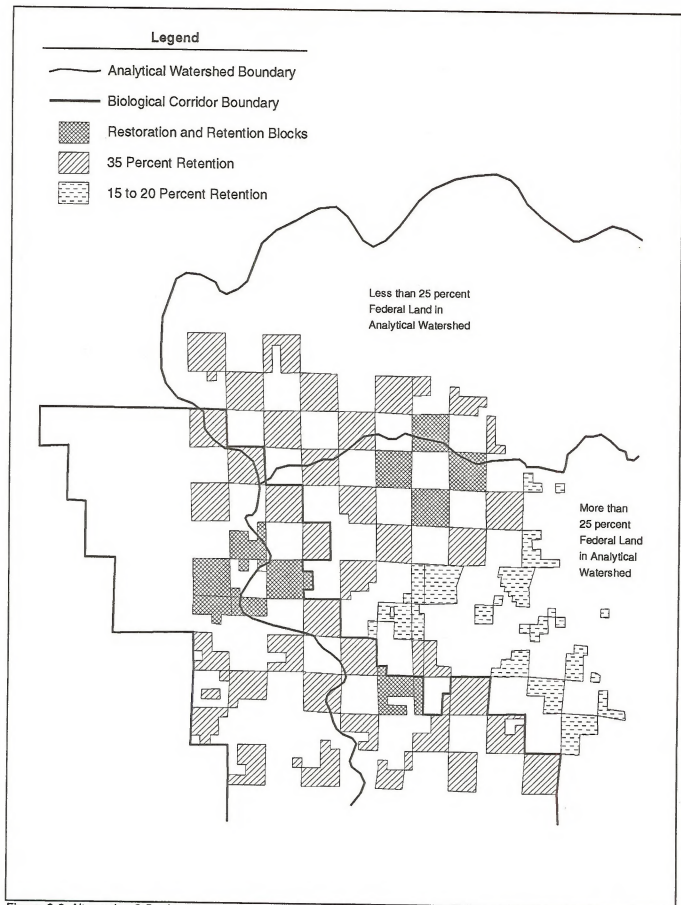


Figure 2-3 Alternative C Design Illustration

High retention lands, totalling about 159,500 acres, would be located within analytical watersheds where federal lands comprise less than 25 percent of the forest land or within one to two miles of restoration and retention areas. Low retention lands, totalling about 79,100 acres, would be located within analytical watersheds where federal lands comprise more than 25 percent of the forest land. High retention lands would be considered potential replacements for old-growth restoration and retention areas where older stands are destroyed by future natural events such as wildfire or windstorms. See figure 2-3 for allocation patterns and the Timber section for additional management details.

In the restoration and retention blocks and partial stand retention areas, public vehicle use would be allowed unless specific biodiversity management problems are identified. Agreements may be pursued with private landowners and other land management agencies to obtain an optimum distribution of restoration and retention areas while minimizing the impact on timber harvest and other resource uses.

Timber

Of the commercial forest land, 238,600 acres (72 percent) would be available for restricted timber production and 90,700 acres would be available for enhancement of other uses or not available for management of forest products (see table 2-1). There would be no unrestricted timber production under alternative C.

Within each partial retention stand, some harvest volume would be produced from a series of density management thinnings and the rest from a regeneration harvest. At the time of regeneration harvest, the majority of the stand would be cut and removed. The site would be prepared for establishment of a new stand beneath the remaining overstory trees, which would be evenly distributed in some locations and grouped in others.

For predominantly conifer stands, regeneration harvests would be conducted under one of two broad prescription concepts. The regeneration harvest prescription would be designed to retain an average of 35 percent of the normal live conifer basal area for the site on 159,500 acres (67 percent of the available forest lands). An individual tree selection or a group selection (one to two acres) harvest system would be used. Normal live conifer basal area defines the density of a fully stocked natural stand (McArdle et al. 1961).

On the remaining 79,100 acres (33 percent) of the available forest lands, the regeneration harvest prescription would retain an average of 18 percent of the normal live conifer basal area for the site, in a well-distributed pattern. The retained trees would consist of a range of sizes including some of the larger trees in the stand.

Stand rotation lengths would be designed to permit the development of structural features similar to those found in old-growth forests, and to maintain those conditions for a period of time equal to at least 20 percent of the rotation length. When a series of density management thinnings is applied to timber stands growing on average sites for the Salem District, old-growth structural conditions could be developed by approximately stand age 120. The regeneration harvest would take place at approximately age 150, allowing the old-growth-like stand to remain for 30 years.

Harvest techniques that minimize impacts to soil and residual vegetation would be used. Timber sales would be logged without additional road construction, wherever feasible. Where road construction is necessary, the density of existing roads plus new roads (in terms of miles of road per square mile of land) would not exceed the density that would be needed if the entire area were to be harvested by clearcutting. New roads would be constructed to the lowest practical standard and density consistent with resource protection and other multiple use values.

Recognizing the role of fire in development of the forest ecosystem, prescribed fire would be favored for site preparation and fuel reduction. Herbicides would be used only in spot suppression of specific species to provide planting spaces or to release individual trees.

Natural regeneration following timber harvest would be encouraged through silvicultural prescriptions, sale design, and reforestation planning. Planting would supplement natural reforestation to minimize regeneration lag time. Seedlings would be planted at wide spacings to encourage a natural regeneration component in the new stand and to delay crown closure. Planting stock of commercial species would be selected from superior tree seed collected from wild trees or from seed orchards developed from wild trees. No more than one-half of the seed would come from such seed orchards. Mixed species would be planted to ensure diversity of the new stand.

Unmanaged sites occupied by hardwoods would not be converted to conifer stands. Hardwood stands growing on hardwood sites would be managed for sustained yield of hardwood timber. Hardwood stands which became established on conifer sites following logging may be converted back to conifer stands. Some hardwoods would be included in the new stands.

Native hardwoods would be retained or restored as part of the species mix in conifer forest stands. This would enhance biodiversity, provide natural fertilization, and reduce intensity and spread of wildfire. Hardwoods would be planted where natural propagation is not likely. The goal would be to provide a hardwood component similar to pre-logging levels or to exceed that level to emphasize species that play significant ecological roles.

Fertilization would be used only where needed to supplement natural nitrogen fixation and to enhance growth and development of large trees and old-growth-type structure.

Precommercial thinning and intermediate harvests (thinnings) would be applied to selected stands on approximately 60 percent of the available forest lands. This would be part of a density management program that would be implemented where topography and road access are suitable for partial cut logging. Density management thinnings would also be applied to lands in old-growth restoration and retention areas which do not possess old-growth characteristics. The objective would be to promote open canopy conditions, establish a mixture of tree species, and accelerate development of old-growth structural conditions. Where feasible, intermediate harvests would not remove snags or down logs from the stand.

Special Status Species Habitat

No activities would be undertaken or permitted that would jeopardize populations of federally listed threatened or endangered plants or animals or species officially proposed for such listing. In addition to protection of federally listed and proposed threatened or endangered species, management of areas allocated to conserve biological diversity would focus on protection of category 1 and 2 federal candidate, state-listed and bureau sensitive species (see table 2-1). BLM and BLM-permitted activities would be constrained or modified to the extent considered necessary. This would prevent federal listing of

federal candidate (category 1 and 2) species known to occur only on BLM-administered lands. Actions would also be designed to protect habitats of category 1 and 2 federal candidate, state-listed and bureau sensitive species. This would occur on other Oregon and California lands where mitigation would not diminish commercial use from land allocated to such use and on all public domain lands. If any of those species are suspected to occur on public domain land in an area proposed for a specific site-disturbing activity, a field survey would focus on those species. If their presence is identified on public domain lands, their habitat would be protected.

Other Wildlife Habitat

Timber harvests would be designed to retain (where available) enough snags and dead and down material to meet Old-Growth Definition Task Group standards, which vary according to plant community series. For Douglas-fir stands on western hemlock sites (western hemlock series), the minimum standards are four conifer snags per acre, larger than 20 inches diameter at breast height and more than 15 feet tall; and 15 tons of down logs per acre including four pieces per acre, larger than 24 inches in diameter and more than 50 feet long.

Special habitats (e.g., dry meadows, wet meadows and talus slopes) would be buffered by 100 to 200 feet when considered to be significant habitat by interdisciplinary team reviewers.

Forage would be seeded on 200 to 400 acres per year, and approximately 54 miles of fish habitat would be improved during the expected life of the plan (i.e., the next ten years). For a comparison of habitat work by alternative, see table 2-1. See Management Direction Common to Alternatives A through E, Wildlife and Fish Habitat, for a list of elk habitat areas proposed for vehicle closure.

Special Areas

Twenty-two existing special areas and ten new special areas would be allocated and managed (see table 2-1).

Recreation

Twelve recreation sites, one special recreation management area and three trails would be maintained and managed (see table 2-1).

To retain options for future development, no timber would be sold in high-value, potential recreation sites, trails and sightseeing areas during the life of the plan. Exceptions would be made if a natural catastrophe (e.g., fire or windstorm) destroyed the recreation development potential of the sites or areas, or for salvage sales of dead and dying timber.

Two new special recreation management areas would be allocated. There would be no planned disturbance of these areas pending completion of site-specific management plans.

Approximately 310,600 acres would be open year-round to motorized vehicle use (see table 2-1).

Wild and Scenic Rivers

Three river miles (one segment) would be found suitable for designation as scenic and 28.5 river miles (three segments) as recreational river areas (see table 2-1).

Visual Resources

The following lands would be managed as inventoried: available forest land where federal ownership consists of more than half of a watershed and available forest land within one-quarter mile of developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the federal Wild and Scenic Rivers Act. All other available forest land would be managed as visual resource management class IV, except as noted under Rural Interface Area management. The remaining lands would be managed as inventoried. Acres that would be managed for each visual resource management class are shown in table 2-1.

Land Tenure

Exchanges of public domain lands would be made to benefit one or more of the resources managed, including nontimber values. Exchanges of Oregon and California lands would emphasize opportunities that would contribute to conservation of biological diversity or would enhance timber management opportunities. Oregon and California lands other than available commercial forest lands, and public domain lands would be sold if they met any of the criteria of Federal Land Policy and Management Act section 203(a). Such lands would be leased to accommodate other appropriate uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in zones 2 and 3 to provide appropriate facilities or services.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leasables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 67,400 acres; and salables - 370,600 acres. Activity would be restricted in accordance with management objectives of this alternative. For a comparison of mineral restrictions by alternative, see table 2-1.

Rural Interface Areas

Approximately 17,500 acres of BLM-administered lands within one-quarter mile of private land in managed rural interface areas (zoned for 1 to 20-acre lots). Of this total, 14,900 acres would be managed for visual resource management class III objectives (see table 2-1). The following alternative timber management practices would be applied on those lands, where feasible and consistent with biological diversity and sustained yield timber management:

- hand application of herbicides and pesticides;
- extension of riparian management areas to protect domestic water diversions; and
- hand piling of slash for burning.

Alternative D

Water Quality and Riparian Zones

Riparian management areas would be allocated on each side of perennial streams and other waters. Riparian management areas for third order and larger streams would be approximately two times the riparian vegetation zone. The following are expected average widths on each side of the perennial water: first and second order, 75 feet (50-foot minimum); third order, 140 feet; fourth order, 200 feet; fifth order, 280 feet; sixth order, 320 feet; other waters (e.g., lakes), 200 feet (see table 2-1). The expected average width of riparian management areas on second order intermittent water would be 60 feet. A 25-foot buffer of shrubs and nonmerchantable trees would be maintained on first order intermittent streams.

Old-Growth and Mature Forest

Lands currently and/or eventually providing old-growth and mature forest habitat would include the

following allocations: unsuitable woodlands; suitable woodlands; riparian management areas; Table Rock Wilderness; 12 developed and 12 potential recreation sites; three potential special recreation management areas; Recreation and Public Purpose Act leases; 22 existing and 10 potential special areas which meet alternative D criteria; the potential Elkhorn Creek wild river area; and special status species habitat where disturbances would be prohibited. These forest lands total 98,800 acres, of which 10,400 acres are old-growth and 25,200 acres are mature forest.

An additional 110,300 acres of forest land would be set aside from timber harvest and new road construction and would be managed according to recommendations of the Interagency Scientific Committee's Conservation Strategy for the northern spotted owl (i.e., habitat conservation areas). Management prescriptions for these areas are described in the Timber and Special Status Species sections. Of this land, 14,700 acres are old-growth and 22,400 acres are mature forest.

Total forest land allocated to provision of old-growth and mature forest would be 209,100 acres of which 25,100 are old-growth and 47,600 are mature forest.

Timber

In this alternative, 161,800 acres (49 percent) of the commercial forest land would be allocated to restricted management of forest products and 167,500 acres would be available only for enhancement of other uses or not available for management of forest products (see table 2-1).

Special Status Species Habitat

No activities would be undertaken or permitted that would jeopardize populations of federally listed threatened or endangered plants or animals or species officially proposed for such listing. In addition to protection of federally listed and proposed threatened or endangered species, habitats of federal candidate, state-listed and bureau sensitive species would be managed to enhance them where appropriate. In all cases, the BLM would avoid contributing to the need to list such species. If any of these species are suspected to occur in an area proposed for a specific site-disturbing activity, a field survey would focus on those species. If their presence is identified, their habitat would be protected.

Spotted owl habitat conservation areas would be established as shown on the alternative D map of the draft resource management plan. Timber harvest would not be planned in these areas, and logging and other silvicultural activities (except stand regeneration) would not be conducted. Road construction in habitat conservation areas would take place only where no feasible alternative exists. When roads are constructed in habitat conservation areas, they would be located and engineered to minimize loss and alteration of spotted owl habitat. They would not be located within one-quarter mile of the activity center of any spotted owl pair. Reforestation activities on cutover lands in habitat conservation areas would encourage a mix of species in the regenerating forest.

In the forest matrix (i.e., outside habitat conservation areas), BLM-administered lands in each quarter township would be managed so that 50 percent of the land would have stands averaging 11 inches or more diameter at breast height with at least 40 percent canopy closure.

Other Wildlife Habitat

During timber sale planning, suitable wildlife trees would be identified for retention. The target would be retention of all soft snags consistent with safety standards, three hard snags per acre (larger than 20 inches diameter at breast height and 10 feet tall), and two green trees per acre, larger than 20 inches diameter at breast height.

Where available, 350 linear feet per acre of downed logs would be retained in final harvest timber sale units. These would include all class 1 logs if hollow or rotten and class 2 and 3 logs larger than 20 inches in diameter. Smaller material would be left on site unless removal is needed for tree planting.

Special habitats would be buffered by 100 to 300 feet when considered to be significant habitat by interdisciplinary team reviewers.

Forage would be seeded on 200 to 300 acres per year, and approximately 54 miles of fish habitat would be improved during the expected life of the plan (i.e., the next ten years). For a comparison of habitat work by alternative, see table 2-1. See Management Direction Common to Alternatives A through E, Wildlife and Fish Habitat, for a list of elk habitat areas proposed for vehicle closure.

Special Areas

Twenty-two existing special areas and ten new special areas would be allocated and managed (see table 2-1).

Recreation

Twelve recreation sites, one special recreation management area and seven trails would be maintained and managed (see table 2-1).

To retain options for future development, no timber would be sold in high-value, potential recreation sites, trails and sightseeing areas during the life of the plan. Exceptions would be made if a natural catastrophe (e.g., fire or windstorm) destroyed the recreation development potential of the sites or areas, or for salvage sales of dead and dying timber.

Three new special recreation management areas would be allocated (see table 2-1). There would be no planned disturbance of these areas pending completion of site-specific management plans.

Some 292,600 acres would be open year-round to motorized vehicle use (see table 2-1).

Wild and Scenic Rivers

Three river miles (one segment) would be found suitable for designation as wild, 12.9 river miles (two segments) as scenic, and 34.8 river miles (four segments) as recreational river areas (see table 2-1).

Visual Resources

All lands except rural interface areas (see below) would be managed as inventoried for their visual characteristics (see table 2-1).

Land Tenure

Exchanges would be made to benefit one or more of the resources managed. Exchanges involving disposal of timber to acquire lands containing greater nontimber values would be emphasized. Sales of lands other than available commercial forest lands would be made if they met criteria (1) or (2) of Federal Land Policy and Management Act section 203(a). No lands would be leased, except as leases and conveyances under the Recreation and Public Purposes Act in zones 2 and 3 to provide appropriate facilities or services.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leaseables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 66,000 acres; and salables - 358,200 acres. Activity would be restricted in accordance with management objectives of this alternative. For a comparison of mineral restrictions by alternative, see table 2-1.

Rural Interface Areas

Approximately 17,500 acres of BLM-administered lands within one-quarter mile of private land in managed rural interface areas (zoned for 1 to 20-acre lots). Of this total, 16,900 acres would be managed for visual resource management class II objectives (see table 2-1). The following alternative timber management practices would be applied on those lands:

- harvest regimes other than clearcutting;
- extension of riparian management areas to protect domestic water diversions; and
- hand piling of slash.

Alternative E

Water Quality and Riparian Zones

Riparian management areas would be allocated on each side of all streams and other waters. Riparian management areas for third order and larger streams would be two to three times the actual riparian vegetation zone. The following are expected average widths on each side of perennial water: first and second order, 75 feet (50-foot minimum); third order, 200 feet; fourth order, 200 feet; fifth order, 280 feet; sixth order, 320 feet; and other waters (such as lakes), 400 feet (see table 2-1). The expected average widths for intermittent water would be first order, 50 feet and second order, 60 feet.

Old-Growth and Mature Forest

Lands currently and/or eventually providing old-growth and mature forest habitat would include the following allocations: nonsuitable woodlands; suitable woodlands; suitable commercial forest land on site 5 lands; areas classified fragile gradient - restricted;

riparian management areas; Table Rock Wilderness; 12 developed and 14 potential recreation sites; four potential special recreation management areas; Recreation and Public Purpose Act leases; the potential Elkhorn Creek wild river area; 22 existing and 11 potential special areas; special status species habitat where disturbances are prohibited. These forest lands total 133,800 acres, of which 13,200 acres are old-growth and 33,400 acres are mature forest.

An additional 62,900 acres of forest land would be set aside in the following areas:

- greater than 150 year-old stands and in 400-foot buffers around those stands;
- lands lying within approximately two miles of spotted owl nests or habitat cores occupied in recent years; and
- 40-acre blocks within each section where BLM administers at least one-half of the land.

The purposes of protecting lands within the 400-foot areas are to assist in maintaining natural ecological elements, protect the older forest from edge effect and natural disaster, and to interconnect the older forest in a sustainable network. The purpose of allocating the 40-acre blocks is to provide habitat for amphibians and the pileated woodpecker. Of the total land in these areas, 19,500 acres are old-growth and 31,300 acres are mature forest.

Total forest land allocated to provision of old-growth and mature forest would be 196,700 acres of which 32,700 acres are old-growth and 64,700 acres are mature forest.

Timber

In this alternative, 132,700 acres (40 percent) of the commercial forest land would be allocated to intensive management of forest products; 41,400 acres of visual resource management class II areas and rural interface areas would be available for restricted management of forest products; and 155,200 acres would be available for enhancement of other uses or not available for management of forest products (see table 2-1).

Special Status Species Habitat

No activities would be undertaken or permitted that would jeopardize populations of federally listed threatened or endangered plants or animals or species officially proposed for such listing. In addition to protection of federally listed and proposed threat-

ened or endangered species, habitats of federal candidate, state-listed and bureau sensitive species would be managed to enhance them where appropriate. In all cases, the BLM would avoid contributing to the need to list such species (see table 2-1). If any of these species are suspected to occur in an area proposed for a specific site-disturbing activity, a field survey would focus on those species. If their presence is identified, their habitat would be protected.

Other Wildlife Habitat

During timber sale planning, suitable wildlife trees would be identified for retention. The target would be retention of all soft snags consistent with safety standards, three hard snags per acre (larger than 20 inches diameter at breast height and 10 feet tall), and two green trees per acre, larger than 20 inches in diameter. In addition, 20 percent of the land in each harvest unit would be retained for cavity nester habitat in two-acre patches.

Where available, 350 linear feet per acre of down logs would be retained in regeneration harvest timber sale units. These would include all class 1 logs if hollow or rotten and class 2 and 3 logs larger than 20 inches in diameter. Smaller material would be left on site unless removal is needed for tree planting.

Special habitats would be buffered by 100 to 300 feet when considered to be significant habitat by interdisciplinary team reviewers.

Forage would be seeded on 200 to 400 acres per year, and approximately 54 miles of fish habitat would be improved during the expected life of the plan (i.e., the next ten years). For a comparison of habitat work by alternative, see table 2-1. See Management Direction Common to Alternatives A through E, Wildlife and Fish Habitat, for a list of elk habitat areas proposed for vehicle closure.

Special Areas

Twenty-two existing special areas and eleven new special areas would be allocated and managed (see table 2-1).

Recreation

Twelve recreation sites, one special recreation management area and seven trails would be maintained and managed (see table 2-1).

To retain options for future development, no timber would be sold in potential recreation sites, trails and sightseeing areas during the life of the plan. Exceptions would be made if a natural catastrophe (e.g., fire or windstorm) destroyed the recreation development potential of the sites or areas, or for salvage sales of dead and dying timber.

Six new special recreation management areas would be allocated. With the exception of Mill Creek and the North Fork Siletz River, there would be no planned disturbance of these areas pending completion of site-specific management plans. The excepted areas would be managed for multiple use.

Approximately 262,100 acres would be open year-round to motorized vehicle use (see table 2-1).

Wild and Scenic Rivers

Three river miles (one segment) would be found suitable for designation as wild, 12.9 river miles (two segments) as scenic, and 51.2 river miles (five segments) as recreational river areas (see table 2-1).

Visual Resources

Visual resource management class I management would apply to all lands so inventoried plus all BLM-administered lands within a quarter mile of developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the federal Wild and Scenic Rivers Act. Visual resource management class II management would apply to lands in identified rural interface areas (see Rural Interface Area management section) and all remaining lands inventoried as visual resource management class II. Land inventoried as visual resource management class III or IV would be managed as class III (see table 2-1).

Land Tenure

Exchanges would be made to benefit one or more of the managed resources. Exchanges involving disposal of timber to acquire lands containing greater nontimber values would be emphasized. Sales of lands other than available commercial forest lands would be made if they met criteria (1) or (2) of Federal Land Policy and Management Act section 203(a). No lands would be leased, except as leases and conveyances under the Recreation and Public Purposes Act in zones 2 and 3 to provide appropriate facilities or services.

Energy and Minerals

The amount of BLM-administered land with potential for occurrence and available for exploration and development of energy and mineral resources would be as follows: leasables (see Management Direction Common to Alternatives A through E, Energy and Minerals section); locatables - 65,600 acres; and salables - 358,400 acres. Activity would be restricted in accordance with management objectives of this alternative. For a comparison of mineral restrictions by alternative, see table 2-1.

Rural Interface Areas

Approximately 36,400 acres of BLM-administered lands within one-half mile of private lands in managed rural interface areas would be administered for retention of visual characteristics. Of the total, 31,800 acres would be managed to meet visual resource management class II objectives (see table 2-1). Where feasible, harvesting would employ multiple-aged or even-aged management silvicultural systems from a logging and stand management perspective. Small (under five-acre) patchcuts or shelterwoods would be used elsewhere. The silvicultural systems employed would not include the use of prescribed fire or herbicides.

Coordination and Consultation

The implementation of this resource management plan and the overriding SEIS record of decision, calls for a high level of coordination and cooperation among agencies. A formal procedure for interagency coordination has been created by a Memorandum of Understanding for Forest Ecosystem Management that has been entered into by the White House Office on Environmental Policy, the Department of the Interior, the Department of Agriculture, the Department of Commerce and the Environmental Protection Agency. The memorandum of understanding created several interagency groups, including the Interagency Steering Committee, Regional Interagency Executive Committee, and Regional Ecosystem Office. A detailed description of these groups is included in Attachment A, Section E, Implementation, of the SEIS record of decision.

Consultation under the Endangered Species Act will emphasize an integrated ecosystem approach. This will include involving the U.S. Fish and Wildlife

Service and the National Marine Fisheries Service in all relevant implementation planning, so their views can be made known. Actions proposed to implement this resource management plan will undergo consultation, either formal or informal, as appropriate. Consultation for the northern spotted owl on activities that are consistent with the standards and guidelines of the SEIS record of decision and that would not result in take of a listed species is expected to be informal. If take would result, incidental take statements would be provided through formal consultation.

Concurrent coordination with the Environmental Protection Agency and the Oregon Department of Environmental Quality on water quality standards and beneficial use requirements of the Clean Water Act will minimize project impacts. Similar coordination with the Environmental Protection Agency, Department of Environmental Quality and the Forest Service on minimizing impacts of emissions from prescribed burning will occur.

By documents signed April 22, 1980, and December 2, 1986, respectively, the Confederated Tribes of Siletz Indians and the Confederated Tribes of the Grande Ronde Community have off-reservation trust resources. These agreements were signed by officials of the state of Oregon, U.S. Department of the Interior, and U.S. Department of Justice. The agreements provide certain hunting and fishing rights which may be affected by the management of BLM-administered lands in the Salem District. Consultation with the tribes on a government-to-government basis, to ascertain if any aspect of the proposed resource management plan conflicts with these agreements, has been initiated.

Use of the Completed Plan

Many of the management activities described in this proposed resource management plan would be accomplished through contracts and permits. Performance standards are developed and included in a contract or permit. They require the contractor or permittee to comply with applicable laws, regulations, policies and plans. Selection of performance standards is governed by the scope of the action to be undertaken and the physical characteristics of the specific site. The standards, which include design features and mitigating measures, must be followed in carrying out an action.

Site-specific planning by interdisciplinary teams will precede most on-the-ground management activities. Interdisciplinary teams are comprised of relevant resource management disciplines. The interdisciplinary team process includes field examination of resources, selection of alternative management actions, analysis of alternatives, and documentation to meet National Environmental Policy Act requirements. Adjacent land uses will be considered during site-specific land management planning.

In addition to being routinely monitored, the resource management plan will be formally evaluated at the end of every third year after implementation begins. Evaluation will continue until such time as preparation of new plans, that would supersede the resource management plan over a substantial majority of its area, is well under way. The reason for the formal evaluation is to determine whether there is significant cause for an amendment or revision of the plan. Evaluation includes a cumulative analysis of monitoring records. The purpose of the analysis is to determine if the plan's goals and objectives are being or are likely to be met, and whether the goals and objectives were realistic and achievable in the first place.

Evaluation will also assess whether changed circumstances, such as changes in the plans of other government agencies or Indian tribes, or new information have altered activities or expected impacts on water, wildlife, socioeconomic conditions, etc. The environmental consequences of changed circumstances may paint a substantially different picture from that anticipated in the proposed resource management plan.

As part of these third year evaluations, the allowable sale quantity will be reevaluated to incorporate the results of watershed analyses, monitoring, further inventory, and site-specific, watershed-specific or province-level decisions.

If an evaluation concludes that the plan's objectives are not achievable, a plan amendment or revision will be initiated. If the evaluation concludes that land use allocations or management actions/direction need to be modified, a plan amendment or revision may be appropriate. An analysis will address the need for either. If the analysis determines that amending the plan is appropriate, the amendment process set forth in 43 Code of Federal Regulations 1610.5-5 or 1610.5-6 will be followed. If amendment is not appropriate, National Environmental Policy Act procedures would still be followed before the modification is approved. If SEIS record of decision standards and guidelines or land-use allocations would be

modified, the amendment process would be coordinated through the Regional Ecosystem Office and the Regional Interagency Executive Committee. Figure 2-4 shows how monitoring and/or evaluation could lead to a revision of management direction or other changes in the resource management plan.

No additional evaluations of this type would be done unless some changed circumstance or unusual event causes the continuing validity of the plan to be questioned. Following completion of each plan evaluation, a summary of its findings will be included in the district's annual program summary.

In future years, new plans may be prepared which would substantially supersede this resource management plan. If the new plan is well under way, and if some circumstances change or unusual events occur of a magnitude that call into question BLM's ability to meet some of the remaining plan objectives, interim management adjustments may be made to meet those objectives, without a plan amendment. The kind of circumstance which could lead to such an adjustment might be an announcement of research findings which clearly establish that some of the plan's goals and objectives are unlikely to be met. The kind of unusual event which could lead to such an adjustment might be a major catastrophe such as a wildfire or windstorm causing extensive damage to forest stands. Similar interim adjustments can be made at any time during the life of the plan, pending evaluation and possible plan amendment.

Adaptive Management

This approach to evaluation and Interim adjustment will frame a process of adaptive management, permitting effective response to changing knowledge. Adaptive management is a continuing process of action-based monitoring, researching, evaluating and adjusting with the objective of improving the implementation and achieving the goals of the resource management plan. The resource management plan is based on current scientific knowledge. To be successful, it must have the flexibility to adapt and respond to new information. Under the concept of adaptive management, new information will be evaluated and a decision will be made whether to make adjustments or changes. The adaptive management approach will enable resource managers to determine how well management actions meet their objectives and what steps are needed to modify activities to increase success or improve results.

The adaptive management process will be implemented to maximize the benefits and efficiency of the resource management plan. This may result in the refinement of management direction or land-use allocations which may require amendment of the resource management plan. Adaptive management decisions may vary in scale from individual watersheds, specific forest types, physiographic provinces, or the entire planning area. Many adaptive management modifications may not require formal changes to the resource management plan.

The model displayed in figure 2-5 identifies the various steps, activities, and outline of a procedure for the adaptive management process. This diagram conveys the general concept, and is valuable as a starting point, for understanding adaptive management. A full and detailed explanation of the model, which is beyond the scope of this discussion, would require that each step be further broken down and defined.

New information that would compel an adjustment of strategy may come from monitoring, research, statutory or regulatory changes, organizational or process assessments, or any number of additional sources. During the evaluation process, personnel will analyze the information to determine the nature, scope, and importance of the new information.

Adaptive management could entail modification of silvicultural prescriptions. Increasing knowledge could provide greater certainty about anticipated climate change or the habitat needs of spotted owls, to cite two examples that could have widespread application. Adaptive management could equally entail modification of rather localized management practices to respond to the results of monitoring.

Any potential new management actions identified after resource management plan/record of decision approval would be reviewed before BLM moves to implement them. For example, if a new area of critical environmental concern proposal meets BLM criteria for consideration, the district manager may prescribe interim management measures for the remaining life of the plan. Such interim management must meet the objectives of the resource management plan, except where inconsistent with the regulations regarding areas of critical environmental concern. Interim management would be subject to analysis in an environmental impact statement or environmental assessment linked to a proposed plan amendment or a broader plan revision.

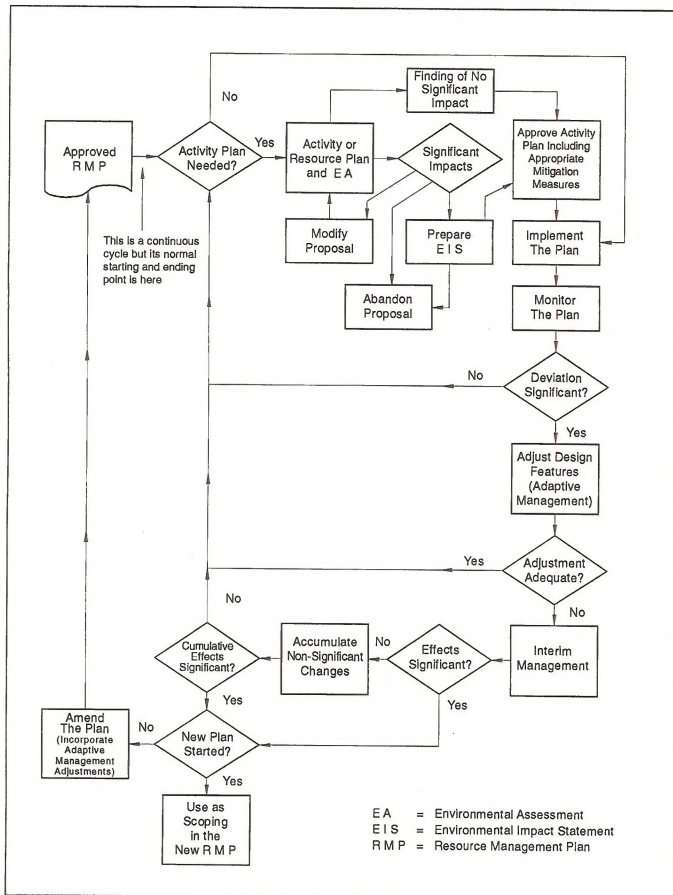


Figure 2-4 Process for Changing the Resource Management Plan

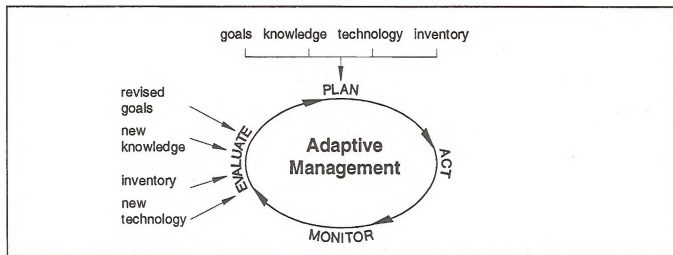


Figure 2-5 Basic Adaptive Management Model

Watershed Analysis

Watershed analysis is one of the principal means that will be used to meet the ecosystem management objectives of this resource management plan. Watershed analyses will be the mechanism to support ecosystem management at approximately the 20 to 200 square mile watershed level. Watershed analysis, as described here, focuses on its broad role in implementing the ecosystem management objectives prescribed by these standards and guidelines. The use of watershed analysis, as described in the Aquatic Conservation Strategy (see description of the proposed resource management plan), is a more narrow focus and is just one aspect of its role.

Watershed analysis will focus on collecting and compiling essential resource management information within the watershed. It will be an analytical process, not a decision-making process with a proposed action requiring National Environmental Policy Act documentation. It will serve as the basis for developing project-specific proposals, and determining monitoring and restoration needs for a watershed. Some analysis of issues or resources may be included in broader scale analyses because of their scope. The information from the watershed analyses will contribute to decision making at other levels. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information.

The results of watershed analyses may include a description of the resource needs, issues, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses to comply with National Environmental Policy Act regulations, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from watershed analysis will be used to develop priorities for funding and implementing actions and projects, and will be used to develop monitoring strategies and objectives. The participation in watershed analysis of adjacent landowners, private citizens, interest groups, industry, government agencies, and others will be promoted.

Watershed analysis will be an ongoing, iterative process that will help define important resource and information needs. As watershed analysis is further developed and refined, it will describe the processes and interactions for all applicable resources. It will be an information-gathering and analysis process, but will not be a comprehensive inventory process. It will build on information collected from detailed, site-specific analyses. Information gathering and analysis will be related to management needs, and not be performed for their own sake. While generally watershed analysis will organize, collate, and describe existing information, there may be critical information needs that must be met before completing the analysis. In those instances, the additional information will be collected before completing the watershed analysis. In other instances, information needs may

be identified that are not required for completing the watershed analysis but should be met for subsequent analyses, planning, or decisions.

Watershed analysis is a technically rigorous procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structures, functions, processes and interactions occurring within a watershed. The scope of the analysis for implementing the ecosystem management objectives of these standards and guidelines may include all aspects of the ecosystem. Some of these aspects include beneficial uses; vegetation patterns and distribution; flow phenomena such as vegetation corridors, streams, and riparian corridors; wind; fire (wild and prescribed fire, and fire suppression); wildlife migration routes; dispersal habitat; terrestrial vertebrate distribution; locally significant habitats; human use patterns throughout the ecosystem; cumulative effects; and hydrology. The number and detail of these aspects considered will depend on the issues pertaining to a given watershed.

In the initial years of implementation, the process for watershed analysis is expected to evolve to meet long-term objectives. However, some projects proposed for the first few years of implementation are in areas that require watershed analysis prior to approval of the projects (i.e., Key Watersheds and Riparian Reserves). In fiscal years 1995 and 1996, watershed analysis done for these projects may be less detailed than analyses that are completed in later years. Regardless, analysis done during the initial years (fiscal years 1995 and 1996) will comply with the following guidance:

- The goal of the analysis is to determine whether the proposed actions are consistent with the objectives, land-use allocations and management direction of the resource management plan.
- Existing information will be used to the greatest extent possible, with new information collected, to the maximum extent practicable, to fill crucial data gaps.
- Analysis will address the entire watershed, even though some areas may be analyzed at a lower level of precision, and the analysis of issues may be prioritized.
- Information from the analysis will flow into the National Environmental Policy Act documentation for specific projects, and will be used where practicable to facilitate Endangered Species Act and Clean Water Act compliance.
- Restoration opportunities will be identified.

A pilot watershed analysis program has been initiated to develop and test an effective long-term process. A scientifically peer-reviewed Watershed Analysis Guide will be finalized based on experiences gained in the pilot program.

The results of watershed analysis will influence final decisions both on timing of land-disturbing activities such as timber sales and on application of design features and mitigating measures, including best management practices for water quality protection. Monitoring and evaluating the effectiveness of best management practices is required by Oregon's Nonpoint Source Management Plan to ensure that water quality standards are achieved and that beneficial uses are maintained. When monitoring identifies previously unanticipated impacts, the information gained from that monitoring will be used in subsequent development of mitigating measures, including best management practices, and considered in future watershed analyses.

Factored into these decisions on land-disturbing activities, where appropriate, would be an assessment of compliance with the anti-degradation policy of Oregon's Water Quality Standards (Oregon Administrative Rules 340-41-026(1)(a)). These standards apply to existing high quality waters which exceed those levels necessary to support recreation and the propagation of fish, shellfish and wildlife.

Proposed timber sales and other land-disturbing activities will incorporate the adaptive management process for developing, implementing and evaluating nonpoint control (best management practices) to determine if water quality goals have been met. Modification of nonpoint-source controls, including best management practices, will be adjusted based upon sound scientific evidence. Where necessary, appropriate actions to mitigate adverse effects on water quality will be taken to protect designated beneficial uses.

Requirement for Further Environmental Analysis

Site-specific environmental analysis and documentation (including environmental assessments, categorical exclusions or administrative determinations where appropriate, and resource management plan conformance determination) would be accomplished for each action or type of treatment under consideration.

Where the action is to be accomplished by a contractor or timber sale purchaser, the environmental assessment or other environmental analysis is a primary means for determining appropriate contract stipulations. Where the action is to be accomplished by BLM personnel, the environmental analysis is a primary means for determining how it will be conducted. When determining whether activities retard or prevent attainment of Aquatic Conservation Strategy objectives, the scale of analysis typically will be BLM analytical watersheds or similar units.

Watershed analysis or province analysis will often precede environmental analysis of specific proposals, and the findings of such preceding analyses will be addressed in documentation of the environmental analyses. Similarly, late-successional reserve assessments will precede activities in those reserves and their findings will be addressed in environmental analysis of those activities. Ultimately, watershed analysis will serve as the basis for developing project-specific proposals and determining monitoring and restoration needs for a watershed. Project-specific National Environmental Policy Act planning will use information developed from watershed analysis. By improving understanding of the ecological structures, functions, processes and interactions occurring within a watershed, watershed analysis will enhance the ability to predict direct, indirect and cumulative impacts of specific proposals in that watershed.

Analyses of proposals for the use of prescribed fire will adhere to the requirements of the Clean Air Act and the state implementation plan (including the Visibility Protection Plan and Smoke Management Plan). Conformity determinations - to evaluate whether BLM actions comply with the State Implementation Plan - will be conducted in association with site-specific environmental analysis, where emissions can be most reasonably forecast in quantified terms. These analyses will specifically evaluate the effects of project-specific prescribed burning on nonattainment areas.

Accurate assessment of local and airshed-level air quality effects of ecosystem management may require cumulative effects analysis, reflecting all relevant BLM actions, as well as expected actions of other parties. Coordination with other agencies is implicit. Cumulative effects analysis will include consideration of the effects on visibility and regional haze. Where extensive fuel hazard reduction by prescribed burning is considered, the analysis also will consider the impact of prescribed burning on reducing the potential for wildfire emissions. This will be done in a quantified tradeoff analysis, comparing emissions from prescribed fire with potential emis-

sions from wildfires if prescribed burning is not accomplished. Factors considered when establishing the geographic boundaries for a cumulative effects analysis include whether the action will result in impacts that cross administrative boundaries, and whether the action will affect sensitive air quality regions (i.e., class I areas and nonattainment areas). Resultant analysis may be based on airsheds.

Interdisciplinary impact analysis will be tiered within the framework of this and other applicable environmental impact statements. Tiering is used to prepare more specific documents without duplicating relevant parts of previously prepared general documents. The more specific environmental assessment or other environmental analysis cannot lead directly to a change in the decisions based on the more general environmental impact statement to which it is tiered. It could, however, result in some interim management direction pending plan revision, or a proposal to amend the plan. If an environmental assessment indicates potential for significant impacts that are seriously different from those described in an existing environmental impact statement, a new environmental impact statement (or supplement to this or another environmental impact statement) may be required.

Specific proposals for treatment to manage competing vegetation would be addressed in site-specific environmental assessments tiered to the *Western Oregon Program-Management of Competing Vegetation Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1989). Specific proposals for control of noxious weeds would be addressed in site-specific environmental assessments tiered to the *Northwest Area Noxious Weed Control Program Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1985) and *Supplement to The Northwest Area Noxious Weed Control Program Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1987).

Availability of environmental assessments for public review will be announced in a minimum of one, and generally all, of the following ways:

- News release distributed to the newsroom of area newspapers, television, and radio stations;
- Notices available at the Salem District Office;
- Mailings to known interested/affected people, groups, tribal units, governmental agencies and businesses. These mailings may include, but are not limited to, the "Salem District Project Update"; and
- Legal notices in one or more newspapers circulated in the project area.

Management Assessments and Plans

A management assessment will be prepared for each large Late-Successional Reserve (or group of smaller Late-Successional Reserves) before habitat manipulation activities are designed and implemented. These assessments may be developed as part of province-level planning or as stand-alone assessments. If developed to stand alone, the assessments will be closely coordinated with subsequent watershed analysis and province-level planning. SEIS record of decision standards and guidelines should be refined at the province level prior to development of Late-Successional Reserve assessments. Late-Successional Reserve assessments will generally include:

- A history and inventory of overall vegetative conditions within the reserve;
- A list of identified late-successional associated species known to exist within the Late-Successional Reserve and information on their locations;
- A history and description of current land uses within the reserve;
- A fire management plan;
- Criteria for developing appropriate treatments;
- Identification of specific areas that could be treated under those criteria;
- A proposed implementation schedule tied to higher order (i.e., larger scale) plans; and
- Proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results.

Only in unusual circumstances will silvicultural treatments, including prescribed fire, precede preparation of this management assessment. Late-Successional Reserve assessments are subject to review by the Regional Ecosystem Office. Until Late-Successional Reserve assessments are completed, fire suppression activities should be guided by land allocation objectives in coordination with local resource management specialists.

Projects and activities within Late-Successional Reserves (including restoration, recreation, projects for public safety, thinning and salvage) may proceed in fiscal years 1995 and 1996 using initial Late-Successional Reserve assessments done at a level

of detail sufficient to assess whether the activities are consistent with the objectives of the Late-Successional Reserves.

A plan will be developed for the Northern Coast Range Adaptive Management Area. An individual public, interagency approach to planning will be developed for the Adaptive Management Area. The plan should address or provide:

- A shared vision of the Adaptive Management Area, (e.g., the kind of knowledge the participants hope to gain). Identification of the desired future conditions may be developed in collaboration with communities, depending on the area;
- Learning that includes social and political knowledge, not just biological and physical information;
- A strategy to guide implementation, restoration, monitoring and experimental activities;
- A short-term (three to five year) timber sale plan and long-term yield projections;
- Education of participants;
- A list of communities strategies, and resources and partners being used;
- An inventory of community strategies, and resources and partners being used;
- Coordination with overall activities within the province;
- A funding strategy; and
- Integration of the community strategies and technical objectives.

Management of Newly Acquired Lands

Lands may come under BLM administration after completion of the resource management plan/record of decision through exchange, donation, purchase, revocation of withdrawals of other federal agencies, or relinquishment of Recreation and Public Purpose Act leases. Newly acquired or administered lands or interests in lands would be managed for their highest potential or for the purposes for which they are acquired. For example, lands acquired within special management areas with congressional or resource management plan allocation/direction will be managed in conformance with guidelines for those areas. If lands with unique or fragile resource values are acquired, it may be appropriate to protect those values until the next plan revision.

Lands acquired with no identified special values or management goals would be managed in the same manner as surrounding or comparable BLM-administered lands. This implies typical timber harvest opportunities, intensive timber management practices, management of the mineral estate, standard operating procedures and precommitted mitigation measures.

Costs of Management

The costs of implementing the alternatives would vary, primarily according to the complexity of management proposed, the amount of timber that would be offered for sale, and the intensity of management of other resources.

Alternatives that propose mostly traditional timber management approaches (alternatives no action, A, B, D and E), even though they allocate widely variable acreage for that purpose, would entail timber management costs essentially proportional to the proposed timber sale volume. These would be consistent with past management costs for this purpose. The alternatives that exclude the most lands from timber harvest would tend to increase costs per unit of timber sold, as necessary road investments and maintenance costs would be prorated against less volume. Countervailing savings may occur, however, as the more restrictive alternatives tend to leave those lands requiring the least costly mitigation available for harvest.

In contrast, the costs of non-traditional forest management as proposed in the proposed resource management plan and alternative C would be much higher per unit of timber sold than for the other alternatives. The proposed resource management plan, with its requirements for watershed analysis, Late-Successional Reserve assessments, Adaptive Management Area plans and watershed restoration, entails costs not associated with the other alternatives. Many of these additional costs of the proposed resource management plan and alternative C are associated with the ecosystem management approach which focuses on functions of ecosystems. Many of these functions and related forest conditions are not recognized in quantifiable market values and many expected outcomes will not be realized until many years after investments are made.

The annual cost of implementing the no action alternative would be similar to the Salem District's fiscal year 1993 budget, with slight adjustment for inflation, or approximately \$13,000,000. Cost esti-

mates for alternatives A, B, C, D, and E have not been developed. The initial annual cost of implementing the proposed resource management plan is reflected in the President's fiscal year 1995 budget, approximately \$17,000,000 for the Salem District. There is not yet, however, a clear understanding of what the management needs and costs of the ecosystem management approach will be, so future year budget estimates may differ as experience is gained in implementing the proposed resource management plan.

The Budget Link

Timber sale levels and associated programs will be reduced if annual funding is not sufficient to support the relevant actions assumed in the plan, including mitigation and monitoring. The extent of the reduction will be based on the principle of program balance as envisioned in the plan. For example, if funding in a given year is sufficient only to support half of planned annual investments in pre-commercial thinning, the otherwise anticipated timber sale volume for that year would be reduced by half of the portion of the declared allowable sale quantity attributable to pre-commercial thinning. If, in subsequent years, budget levels permit BLM to eliminate the backlog of unfunded investments that have accumulated, timber sale levels will be adjusted upward to the extent that the work can be accomplished. If subsequent budget levels create a cumulative shortfall over a few years, the allowable sale quantity will be adjusted downward.

This principle will apply similarly to management of roads and other facilities. If maintenance of such facilities is not adequately funded, some of them may be closed to scale back management commitments to the level that is budgeted.

Monitoring

The BLM planning regulations (43 Code of Federal Regulations 1610.4-9) call for the monitoring and evaluation of resource management plans at appropriate intervals.

Monitoring is an essential component of natural resource management because it provides information on the relative success of management strategies. The implementation of the resource management plan will be monitored to ensure that management actions: follow prescribed management direction (implementation monitoring), meet desired

objectives (effectiveness monitoring), and are based on accurate assumptions (validation monitoring) (see appendix P). Some effectiveness and most validation monitoring will be accomplished by formal research.

Monitoring will be an integral component of many new management approaches such as adaptive management and ecosystem management.

Adaptive management is based on monitoring that is sufficiently sensitive to detect relevant ecological changes. In addition, the success of adaptive management depends on the accuracy and credibility of information obtained through inventories and monitoring. Close coordination and interaction between monitoring and research are essential for the adaptive management process to succeed. Data obtained through systematic and statistically valid monitoring can be used by scientists to develop research hypotheses related to priority issues. Conversely, the results obtained through research can be used to further refine the protocols and strategies used to monitor and evaluate the effectiveness of resource management plan implementation.

Monitoring results will provide managers with the information to determine whether an objective has been met, and whether to continue or modify the management direction. Findings obtained through monitoring, together with research and other new information, will provide a basis for adaptive management changes to the plan. The processes of monitoring and adaptive management share the goal of improving effectiveness and permitting dynamic response to increased knowledge and a changing landscape. The monitoring program itself will not remain static. The monitoring plan will be periodically evaluated to ascertain that the monitoring questions and standards are still relevant, and will be adjusted as appropriate. Some monitoring items may be discontinued and others may be added as knowledge and issues change with implementation.

Watershed analysis is one of the principal analyses that will be used to meet the ecosystem management objectives. Information from watershed analysis will also be used in developing monitoring strategies and objectives. Specific to monitoring, the results and findings from watershed analysis are used to reveal the most useful indicators for monitoring environmental change, detect magnitude and duration of changes in conditions, formulate and test hypotheses about the causes of the changes, understand these causes and predict impacts, and manage the ecosystem for desired outcomes. Watershed analysis will

provide information about patterns and processes within a watershed and provide information for monitoring at that scale.

Monitoring information will be collected in the most cost effective manner, and may involve sampling or remote sensing. Monitoring could be so costly as to be prohibitive if it is not carefully and reasonably designed. Therefore, it will not be necessary or desirable to monitor every management action or direction. Unnecessary detail and unacceptable costs will be avoided by focusing on key monitoring questions and proper sampling methods. The level and intensity of monitoring will vary, depending on the sensitivity of the resource or area and the scope of the proposed management activity.

Resource management plan monitoring will be conducted at multiple levels and scales. Monitoring will be conducted in a manner that allows localized information to be compiled and considered in a broader regional context, and thereby address both local and regional issues. At the project level, monitoring will examine how well specific management direction has been applied on the ground and how effectively it produces expected results. Monitoring at broader levels will measure how successfully projects and other activities have achieved the objectives for those management areas.

Monitoring will be coordinated with other appropriate agencies and organizations in order to enhance the efficiency and usefulness of the results across a variety of administrative units and provinces. The approach will build on past and present monitoring work. In addition, specific monitoring protocols, criteria, goals, and reporting formats will be developed, subject to review and guidance of the Regional Ecosystem Office. This guidance will be used to augment and revise the monitoring plan and facilitate the process of aggregating and analyzing information on provincial or regional levels.

Monitoring results will be reported in an "Annual Program Summary", which will be published starting the second year following initial implementation of this resource management plan. The Annual Program Summary will track and assess the progress of plan implementation, state the findings made through monitoring, specifically address the Implementation Monitoring Questions posed in each section of the monitoring plan and serve as a report to the public.

Each resource area will be responsible for the collection, compilation and analysis of much of the data gained through monitoring activities. Resource

areas will report their findings and recommendations to the district for consolidation and publication in the annual program summary.

The monitoring plan for the resource management plan is tiered to the monitoring and evaluation plan for the SEIS record of decision. The SEIS monitoring and evaluation plan is not yet fully refined. Therefore, the proposed resource management plan monitoring plan is not complete. BLM has been, and will continue to be, a full participant in the development of the SEIS monitoring and evaluation plan. Ongoing BLM effectiveness and validation monitoring will continue where it is relevant to resource management plan direction (e.g., stocking surveys, threatened and endangered species studies and water quality measurements).

The SEIS and resource management plan monitoring plans will not identify all the monitoring the Salem District will do. Activity and project plans may identify monitoring needs of their own.

Research

A research plan will be developed by the Research and Monitoring Committee identified in the SEIS record of decision.

Ongoing research in Riparian Reserves will be analyzed to insure that significant risk to the watershed does not exist. If significant risk is present and cannot be mitigated, study sites will be relocated. Some activities not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of the President's Forest Plan; will produce results important for establishing or accelerating vegetation and structural characteristics for maintaining or restoring aquatic and riparian ecosystems; or the activities represent continuation of long-term research. These activities will be considered only if there are no equivalent opportunities outside of Riparian Reserves and Key Watersheds.

Chapter 3

Affected Environment



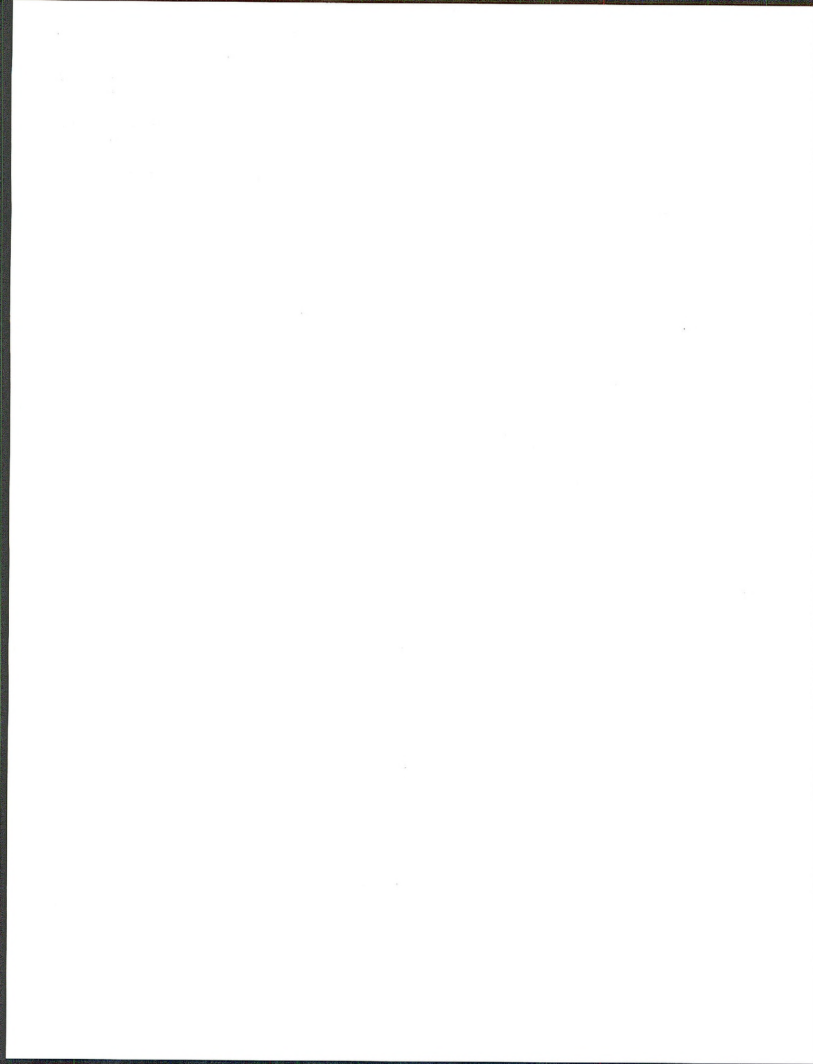
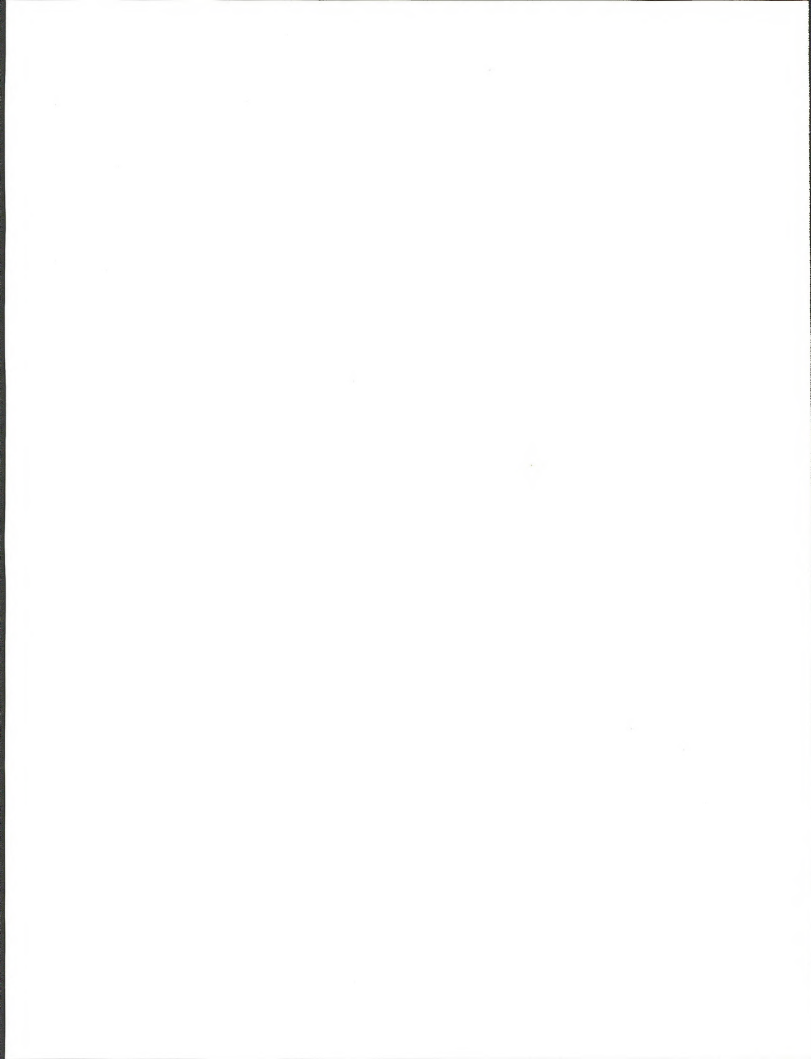


Table of Contents

Chapter 3

Affected Environment

Major Changes from Chapter 3 of the Draft Resource Management Plan	3-1
Introduction	3-2
Climate	3-2
Topography and Geology	3-2
Lands and Transportation	3-3
Air Resources	3-5
Soils	3-9
Water Resources	3-9
Biological Diversity and Ecological Health	3-23
Vegetation Including Special Forest Products	3-29
Riparian Zones	3-35
Wildlife Habitat	3-36
Fish Habitat	3-39
Special Status and SEIS Special Attention Species and Habitat	3-41
Special Areas	3-55
Cultural Resources Including American Indian Values	3-59
Visual Resources	3-60
Wild and Scenic Rivers	3-60
Wilderness	3-62
Recreation	3-63
Timber Resources	3-71
Energy and Mineral Resources	3-78
Socioeconomic Conditions	3-79
Rural Interface Areas	3-87
Fire/Fuels Management	3-88



Major Changes from Chapter 3 of the Draft Resource Management Plan

General

- Chapter 3 appendices are not duplicated in this document (see Salem District Draft Resource Management Plan for chapter 3 appendices).

Air Resources

- Tables 3-3 and 3-4 have been updated to include 1993 data.

Soils

- Acres of fragile nonsuitable woodlands and fragile suitable, restricted areas have been updated and corrected.
- The description of fragile nonsuitable woodlands has been improved.
- The acres of BLM-administered lands with compaction and/or nutrient limitations have been updated.

Water Resources

- The discussion on wetlands has been expanded.
- The discussion on water quality limited streams has been expanded.
- The listing of streams with water quality limitations has been updated to use data from the 1992 Oregon Department of Environmental Quality 309(b) report.
- All references to the Watershed Condition Index have been deleted (see chapter 4 for rationale).

Biological Diversity

- This section has been expanded to include a discussion of ecological health.

Vegetation

- A discussion on special forest products has been added.

Wildlife

- The table on special status species has been updated through August 1993.
- Appendix 3-1, List of Wildlife Species and Primary Habitat Affinities in the Salem District and Description of Federal Candidate Species, has been revised based on public comment. It is available to the public at the Salem District Office.

Wilderness

- The total acreage of Table Rock Wilderness has been corrected from 6,028 acres to 5,800 acres.
- A paragraph has been added describing a potential for adjusting the exterior boundary.

Recreation

- The narrative has been expanded to include a clearer discussion and display of existing and potential special recreation management areas.
- The tables showing both existing and potential recreation sites and existing and potential recreation trails have been separated for clarity.
- The tables showing potential recreation sites and potential recreation trails have been expanded to include additional sites and trails.
- All 1990 recreation visitation figures have been updated to reflect 1993 visitation.

Timber Resources

- Table 3-32 in the draft, Inventory Comparison, has been expanded to two tables, one for conifer stands and one for hardwood stands. A third column for estimated 1993 acres and volumes has been added to each table.
- Table 3-36 in the draft has been deleted. The needed information is contained in table 3-43.

Energy and Mineral Resources

- Low mineral potential has been changed to unknown/low mineral potential.
- Acres for each category equal total district acres.

Socioeconomic Conditions

- Text and tables have been updated where possible.

Fire/Fuels Management

- A description of this program has been included in the proposed resource management plan.

Introduction

This chapter describes the existing physical and biological characteristics of BLM-administered lands and socioeconomic conditions in the planning area. Emphasis is on resources and conditions that could be affected by management alternatives described in chapter 2. Descriptions are commensurate with the importance of impacts. Less important material is summarized or referenced.

The primary sources of information used in this chapter are BLM planning system documents prepared by the district. References are cited in the text by author and date of publication. These references are listed in the References Cited section. Background data (the plan record) and the *Salem District Analysis of the Management Situation* (U.S. Department of the Interior, BLM, SDO 1991) are available for review at the Salem District Office. All maps mentioned in this chapter can be found in the accompanying map packet.

Much of the information in this chapter is derived from the Western Oregon Digital Data Base. Acres used, unless otherwise noted, are derived from the Western Oregon Digital Data Base.

Climate

The climate of the planning area is moist and temperate due to the prevailing westerly winds and proximity to the Pacific Ocean. Winters are generally cool and wet, summers are warm and dry, with substantial variation due to elevation and topographical effects. Precipitation varies from an annual average of around 40 inches in the Willamette Valley to nearly 200 inches in the higher elevations of the Coast Range. The majority of the precipitation (60 to 85 percent) falls from November to March, with only 3 to 5 percent falling from June through August. Monthly average precipitation ranges from 0.35 inches in July to more than 23 inches in January. Snow accounts for only a small percentage of the total precipitation except at higher elevations of the Coast and Cascade ranges. Areas with an elevation of less than 1,500 feet normally receive less than a foot of snow lasting several days each year. Areas above the 1,500-foot level can receive up to several feet of snow lasting two to three months.

Humidity within the planning area varies by season and distance from the ocean. It is quite high because of the typical westerly flow of ocean air over the area.

Relative humidity at night and early morning approaches 90 to 100 percent throughout the year. Daytime humidity ranges from 50 to 90 percent except during periods of easterly airflow when relative humidity decreases to 10 to 20 percent. These periods are uncommon and rarely last more than two weeks.

The daily average temperature within the planning area ranges from a low of around 35 degrees Fahrenheit in January to a high of around 65 degrees Fahrenheit in July. Temperature extremes vary greatly throughout the area due to elevation and proximity to the ocean. Temperatures above 90 degrees Fahrenheit are common in the Willamette Valley and adjacent foothills during the summer months but are uncommon at higher elevations or near the coast. Temperatures below freezing are common throughout the area during the winter months but seldom reach below 20 degrees Fahrenheit except at high elevations. The length of the average growing season in Salem (elevation 196 feet) is 212 days. At the 1,000-foot level the average growing season decreases to about 150 days, and at higher elevations of the Cascade Range it decreases to less than 30 days.

Winds vary throughout the planning area but are usually northwesterly in the summer months and southwesterly during the winter. Winds normally do not exceed 30 m.p.h. except in the Columbia Gorge and along the coast during winter storms. Winds in these areas can exceed 70 m.p.h. several times each year.

Topography and Geology

There are parts of three western Oregon physiographic provinces - the Coast Range, the Willamette Valley, and the Western Cascades - within the Salem District. Each region is characterized by a special assemblage of land forms (Patton 1976).

The Coast Range Province is located in an area roughly bordered by the Willamette Valley on the east, the Pacific Ocean on the west, the Columbia River on the north, and the Coquille River on the south. The landform is characterized by rolling foothills near the Willamette Valley margin and increasingly steep-sloped hills and ridges on the west-facing slope. The crest of the range averages 1,350 feet but is punctuated by many weathered peaks and ridges. At about 4,100 feet, Marys Peak is

the highest point in the region. The proximity of the region to the Pacific Ocean contributes to the heavy rainfall and the resulting dense forests and numerous perennial streams (Patton 1976).

The Coast Range Province is made up of thick submarine volcanic flows, breccia, and tuffaceous sedimentary rock of Eocene Siletz River volcanics overlain in the central part by thick Flournoy sandstone. Both are intruded by many dikes and sills. The seaward side of the Coast Range contains younger and less continuous Oligo-Miocene formations. Approximately 64 percent of Salem District BLM-administered land is located in this province.

The Willamette Valley Province is the only sizeable lowland area in Oregon. It is a broad alluvial plain, approximately 100 miles long and 40 miles wide. The valley floor slopes from about 360 feet elevation at Eugene to near sea level at Portland. The gradients of all streams are gentle on the valley floor. Many forested hills, especially to the north, and numerous buttes rise about 300 feet above the valley floor (Patton 1976).

In the Willamette Valley Province, surface rocks consist of marine beds, middle Miocene Columbia River basalt, and post-basalt, nonmarine formations. Recent alluvium is widespread along streams. Approximately one percent of Salem District BLM-administered land is in this province.

The Western Cascades Province is the dividing line between two broad regions, eastern and western Oregon. The province is generally recognized as having two subregions: the High Cascades on the east and the Western Cascades. The Western Cascades are much older than the High Cascades and are deeply dissected, eventually giving way to a broad alluvial lowland plain. Much of the surface is characterized by steep, fairly high elevation, east-west ridges between gorges cut by the upper courses of numerous major rivers fed by heavy seasonal rainfall (Patton 1976).

The western part of the province is made up almost entirely of slightly deformed and partly altered volcanic flows and pyroclastic rocks that range in age from late Eocene to late Miocene. These rocks have been dissected so that the only remaining evidence of the volcanoes from which they erupted are remnant necks or plugs which mark former vents. The Western Cascades has subsided intermittently and irregularly with the piling on of the great mass of volcanics. Erosion had assisted in keeping the area at a generally low level. With the piling on of volcanics, westward flowing streams became

impeded. The dissection of the present Western Cascades began then, and the dendritic drainage pattern of today was established. Approximately 35 percent of Salem District BLM-administered land is in this province.

Lands and Transportation

Lands

There are approximately 398,100 acres of BLM-administered Oregon and California and public domain lands in the planning area. Table 1-1 and map 1-1 display the amount and distribution of this land. They are distributed in a checkerboard pattern and amount to approximately five percent of the total land in the planning area.

Fifteen lands actions affecting BLM-administered acreage were completed from 1984 through 1992. Approximately 5,926 acres of private land were acquired in four exchanges. Approximately 11,636 acres of BLM-administered lands were transferred out of public ownership by act of Congress, public sale, Recreation and Public Purposes Act sale, exchange, and color-of-title action. Inquiries and proposals regarding land tenure adjustments considered to be in the public interest are processed as funds and time allow.

Withdrawals and classifications of BLM-administered lands are shown in tables 2-7 and 2-8. Withdrawals segregate lands from operations under the general land laws and mineral laws but do not affect BLM surface management. Some of the withdrawals in the planning area have been reviewed to determine need for continuation. Final action is pending on the recommendations to revoke unneeded withdrawals. Classifications segregate lands from all forms of appropriation under the public land laws, including the mining laws but not the mineral leasing laws.

Existing right-of-way corridors cover five Bonneville Power Administration transmission lines ranging from 100 to 160 feet in width. These corridors are shown on map 2-9. The *Western Regional Corridor Study* (Clayton and Associates 1993) did not identify any potential new corridors that would affect BLM-administered lands. Future upgrading of existing transmission lines is considered likely and may require additional right-of-way widths.

Other rights-of-way have been granted for logging roads, domestic and irrigation water lines, and utility lines servicing residences. The majority of these are within or adjacent to road corridors.

There are no active applications for major water storage or hydroelectric projects on BLM-administered lands in the planning area. There is one application pending for a major water storage project, the Walker Creek Municipal Water Supply Project. However, processing of the application, including environmental assessment, has been suspended pending resolution of other issues.

To date, solar and wind power electrical generation has not occurred on BLM-administered lands. Advances in technology during the 1990s could increase interest in developing these alternative energy resources.

There are eight developed hilltop or ridgetop communication sites on BLM-administered lands. Each site is occupied by a number of different users. Locations of these sites are shown on map 2-9.

The state of Oregon holds title to the beds and banks of all navigable waters in the state. The Division of State Lands administers these lands. In the planning area, the following waterways which adjoin BLM-administered lands have been determined to be navigable or are claimed by the state to be navigable:

ble: Alsea, Clackamas, and Santiam rivers (Oregon Division of State Lands 1983). The state could, in the future, assert claims to other waterways based on navigability.

The BLM will work with the state to accommodate the state's 5,202.29 acres of in lieu land entitlement with public domain land.

Transportation

There were 2,555 miles of BLM-controlled roads in the planning area as of May 1993. Table 3-1 displays the inventory of roads. Of the total miles, 2,355 miles are surfaced for all-weather use. Preventive maintenance of roads occurs on a regular cycle. Corrective maintenance occurs as problems are identified. Under current district policy, about 360 miles of road are closed to public use year round. Some roads are closed seasonally to protect road surfaces and minimize erosion or to minimize disturbance to wildlife, particularly in important elk habitat.

Easements and/or reciprocal right-of-way agreements provide legal access to approximately 90 percent of BLM-administered lands for timber management. Access to the public is available on about 50 percent of BLM-administered lands in the planning area. Reciprocal agreements do not include rights for the public to use the roads.

Table 3-1 Miles of BLM-Controlled Roads (May 1993)

Surface Type	Functional Classification ¹			Standard	
	Arterial	Collector	Local	Single Lane	Double Lane
Natural	0.0	87.3	112.9	200.2	0.0
Pit run rock (various sizes)	0.0	586.6	47.6	634.2	0.0
Crushed rock	19.5	1,321.0	222.1	1,543.0	19.5
Bituminous (paved)	152.0	4.8	0.7	95.9	61.6

¹ Functional classifications (U.S. Federal Highway Administration 1989) are defined as follows:

Arterial Roads: Provide service to large land areas, and usually connect with public highways or other arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. They are usually developed and operated for long-term land and resource management purposes and constant service.

Collector Roads: Serve smaller land areas and are usually connected to an arterial or public highway. They collect traffic from local roads or terminal facilities. The location and standard are influenced by long-term multi-resource service needs, as well as by travel efficiency. Collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

Local Roads: Connect terminal facilities with collector or arterial roads, or public highways. The location and standard are usually determined by the need to serve a specific resource activity or project, rather than travel efficiency. Local roads may be developed and operated for either long- or short-term service.

Source: Salem District road records.

Air Resources

The federal Clean Air Act, as amended in 1990, is designed to reduce air pollution, protect human health, and preserve the nation's air resources. To protect air quality, the Clean Air Act requires federal agencies to comply with all federal, state and local air pollution requirements (section 118).

Several federal air quality programs under the Clean Air Act regulate prescribed burning and other activities. The National Ambient Air Quality Standards (NAAQS) are set to protect human health and welfare. Pollutant concentrations that exceed the NAAQS endanger public health. Air pollutants for which federal NAAQS have been established are called criteria air pollutants. They include particulate matter (PM_{10}), sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide and lead.

The Clean Air Act requires each state to develop, adopt, and implement a state implementation plan to ensure that the NAAQS are attained and maintained for the criteria pollutants. These plans must contain schedules for developing and implementing air quality programs and regulations. State implementation plans also contain additional regulations for areas that have violated one or more of the NAAQS. These areas are called nonattainment areas. If states fail to submit state implementation plans, or fail to adhere to schedules therein, the Environmental Protection Agency has the authority to impose federal sanctions or federal implementation plans.

The Clean Air Act established the Prevention of Significant Deterioration program which prevents areas that currently have clean air from being degraded. This program defines three area classifications based on air quality: class I, class II, and class III. Class I areas are subject to the most limiting restrictions regarding how much additional pollution can be added to the air while still protecting air quality. All National Parks and some wilderness areas within the planning area are designated class I. All lands administered by the Forest Service and BLM within this planning area are class II. There are no class III areas within the planning area. Class I areas and class II areas eligible for class I are shown on map 3-1.

As a national goal, the Clean Air Act also sets the protection of visibility in class I areas. The visibility protection program provides for remedying existing, and preventing future, impairment to visibility.

The Clean Air Act gives federal managers of wilderness (class I areas) the affirmative responsibility to protect Air Quality Related Values from adverse impacts of air pollution (section 165(d)). These are values such as visibility, biological diversity, and water quality.

State and local governments have the authority to adopt their own air quality rules and regulations. These rules can be incorporated into the state implementation plan if they are equal to, or more protective than, federal requirements. For example, some states have incorporated smoke management provisions for prescribed burning into their plans.

The state of Oregon Department of Environmental Quality has a state implementation plan that has been approved by the Environmental Protection Agency. This plan addresses the criteria pollutants emitted from prescribed burning (PM_{10}), visibility, and smoke management.

The conformity provisions of the Clean Air Act (section 176(c)), prohibit federal agencies from taking any action that causes or contributes to a new violation of the NAAQS, increases the frequency or severity of an existing violation, or delays the timely attainment of a standard. Section 176(c) specifically states that federal agencies must ensure that their actions conform to the applicable state implementation plan. The Environmental Protection Agency is required to promulgate criteria and procedures for demonstrating and ensuring conformity of federal actions to a state implementation plan. The Environmental Protection Agency finalized these regulations on November 30, 1993 (58 Code of Federal Regulations 63214). Because prescribed fire emissions affect air quality, conformity determinations must be made at subsequent planning levels, such as watershed analyses, and project/site-specific analyses.

Criteria pollutants emitted from or formed as a result of prescribed fire include particulate matter (PM_{10}), oxides of sulfur and nitrogen, carbon monoxide and ozone. Health effects associated with exposure to criteria pollutant levels greater than the NAAQS vary, and include lung damage, the reduction of the blood's ability to carry oxygen, eye irritation, chest pain, nausea, and an increased respiration rate. In terms of effects other than on human health (termed welfare effects), recent studies indicate that some aspects of forest health are adversely affected by several criteria pollutants produced by fire. Additional research is necessary to determine the human health and welfare effects specific to prescribed fire emissions.

Many other noncriteria, but potentially toxic, pollutants are emitted by prescribed fire, including polynuclear aromatic hydrocarbons and aldehydes. Effects vary from exposure to these pollutants emitted during combustion. Some polynuclear aromatic hydrocarbons are known as potential carcinogens; other components, such as aldehydes, are acute irritants. Many of these air toxics dissipate or bind with other chemicals soon after release, making it difficult to estimate human exposure and consequential health effects. Additionally, the health and welfare effects of air toxics released by prescribed burning or wildfires have not been directly studied.

PM_{10} is a term used to describe airborne solid and liquid particles 10 micrometers or smaller in size. Because of its small size, PM_{10} readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema. The Environmental Protection Agency is considering a more stringent NAAQS for PM_{10} because recent studies indicate that the current NAAQS may not be adequate to protect individuals with a greater sensitivity to these particulates. Typical sources of PM_{10} include industrial processes, woodstoves, roads, agricultural practices, and prescribed fires and wildfires.

The air quality analysis in this proposed resource management plan focuses primarily on the impacts of particulate matter from prescribed burning. Particulate matter (PM_{10}) is of the most interest because of the large quantities emitted from fires, the potential contribution of PM_{10} from prescribed fires and wildfires to pollutant concentrations above the PM_{10} standard, the major reduction of visibility caused by PM_{10} , and the role PM_{10} plays as a carrier of other toxic pollutants.

Weather patterns strongly influence air quality and smoke management by controlling the dispersion of emissions from fires. The primary weather conditions that affect dispersion are atmospheric stability, mixing height, and transport wind speed. Atmospheric stability refers to the tendency for air to mix vertically through the atmosphere. Mixing height is the vertical distance through which air is able to mix. Transport wind speed is a measure of the ability of air to carry emissions away from a source horizontally. These three factors determine the ability of the atmosphere to disperse and dilute emissions that are released from prescribed fires and wildfires.

The physiography or physical shape of landscapes interacts with and controls some weather patterns that influence emission dispersion. Many of the interior basins of the Pacific Northwest (e.g., the

Willamette Trough) can trap emissions when the atmosphere is relatively stable and winds are light. The mixing height is shallow, and pollutants may accumulate near the ground in these basins. This atmospheric condition is most likely to occur from November to March. However, little underburning or broadcast burning occurs at this time of year. In other physiographic provinces, and during the remainder of the year, prescribed burning is conducted when transport winds are not expected to carry emissions to smoke-sensitive areas in quantities that affect Prevention of Significant Deterioration increments and visibility. Furthermore, prescribed burning activities are coordinated with state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion.

The Clean Air Act does not consider emissions from wildfires as degrading to overall air quality. These emissions are not controllable as to their trajectory or quantity within smoke sensitive areas. Emissions may accumulate for several days to several weeks at levels significantly higher in criteria pollutants than are allowed under the Clean Air Act. More research is needed to determine the relationship between fuel accumulation, natural decomposition rates, and wildfire emissions.

Prescribed fire use during the recent past was analyzed to assess the effect on air quality of implementing the alternatives. The years 1985 through 1992 were analyzed because prescribed fire use trends for this period were representative of recent forest management practices, and because data quality was reasonably good. The quality of data had improved due to increased monitoring, better estimating techniques, and more accountability in reporting. Detailed reporting of prescribed fire statistics is required in the state smoke management plan.

The goal of the state implementation plan is to reduce particulate matter emissions from prescribed burning by 50 percent by the year 2000 for western Oregon. Current data indicate particulate emissions have been reduced approximately 42 percent since the baseline period was established (Oregon Department of Forestry 1991). This trend is expected to continue. Prescribed fire smoke emissions will not be a factor in meeting air quality standards for PM_{10} in western Oregon.

A primary reason for the emission reduction levels from the calculated baseline period of 1976 to 1979 is the steady decrease in the total tons per acre consumed (see table 3-2). For the planning area, the

average annual prescribed fire fuels consumption rate per acre during the baseline period was approximately 63.6 tons per acre from approximately 1,600 acres. From 1980 to 1984, the consumption rate was 44 tons per acre from an average of 1,974 acres. The present consumption rate, as represented from 1985 to 1988, is 32 tons per acre from approximately 2,145 acres. This reduction in tonnage consumed has a direct proportional effect on the amount of particulate matter produced.

Current total biomass consumption has been reduced by 62 percent from the baseline period. The variation in acres burned and total emissions is a result of weather, smoke management restrictions, and the economic cycles that affect timber harvest.

Prescribed burning during the mid-to-late 1980s reflects a large amount of burning to dispose of harvest residues (usually called slash burning) and to reduce moisture stress and growing-space competition from other onsite vegetation. Slash burning was used to reduce wildfire hazard and to prepare harvested sites for planting. Very little (less than 10 percent) of the burning that occurred from 1985 to 1992 was for ecosystem management purposes. From 1990 to 1992, PM_{10} emissions from prescribed burning declined sharply. During that period, the acreage requiring prescribed fire for slash burning and site preparation was reduced due to decreased timber harvesting. Emissions also decreased with the use of emission reduction techniques.

Not all timber harvest units require treatment by prescribed fire. From 1984 to 1993, approximately 84 percent of the acres with slash created by timber harvest were treated with some form of prescribed burning (see table 3-3).

The air quality impact of prescribed burning during the 1985 to 1992 time period is difficult to quantify. While burning forest residues can create large quantities of particulate matter and other pollutants, this burning usually takes place in relatively remote areas with intensities that vent smoke high into the atmosphere where it is widely dispersed.

There are several designated sensitive air quality areas in the planning area including the heavily populated Willamette Valley and populated areas along the coast (see map 3-1).

Smoke entering a designated area from a prescribed fire is called an intrusion. Intrusions are classified from light to heavy. Intrusions do not necessarily violate air quality standards, although they may cause public nuisances. From 1987 to 1993, an average of 22 intrusions occurred per year in western Oregon. These intrusions were light to moderate in intensity and of short duration (Oregon Department of Forestry 1987 and 1993). The number of intrusions from Salem District prescribed burning has decreased from an average of four per year for the period 1983 to 1987 to less than two per year for the last five-year period. Table 3-4 shows intrusions into the Willamette Valley designated area attributed to burning from prescribed fire in the planning area from 1977 to 1993.

Table 3-2 Average Biomass Consumption Estimates

Category	Calculated Baseline (1976-1979)			Calculated (1980-1984)			Adjusted Salem District		
	<u>Average Consumption</u>			<u>Average Consumption</u>			<u>Average Consumption</u> ¹		
	High	Mid	Low	High	Mid	Low	High	Mid	Low
	(tons per acre)			(tons per acre)			(tons per acre)		
Duff ²	32.3	29.3	26.4	30.0	21.3	15.0	7.5	5.3	3.7
Woody, less than 3"	12.3	12.3	12.3	13.2	9.5	6.7	13.2	9.5	6.7
Woody, more than 3"	16.3	16.0	15.7	14.5	11.0	8.2	14.5	11.0	8.2
Rotten	2.7	2.7	2.6	2.5	2.2	1.9	2.5	2.2	1.9
Total	63.6	60.3	57.0	60.2	44.0	31.8	37.7	28.0	20.5

¹ Reduction in duff consumption due to field measurements of duff depth.

² Sandberg's figures for an average forest duff layer of 4 inches.

Source: Sandberg et al. 1985.

Table 3-3 Prescribed Fire Use Based on Total Available Harvest Acres

Year	Harvest Acres	Prescribed Fire Acres	Percent of Total
1984	3,488	2,191	63
1985	3,617	2,584	71
1986	3,518	2,611	74
1987	3,549	3,233	91
1988	3,233	2,234	69
1989 ¹	3,331	4,509	135
1990	3,384	1,505	44
1991	2,082	1,992	96
1992	5 ²	1,258	NA ³
1993	--- ²	2,377	NA ³
Total	26,207	24,494	84

¹ Prescribed fire acres exceed harvest acres due to favorable smoke management conditions which allowed for treatment of additional units normally carried over to the following year.

² Acres decreased due to court injunction.

³ Not Applicable.

Source: U.S. Department of the Interior, BLM, SDO 1984-1993.

Table 3-4 Smoke Intrusions in the Willamette Valley

	Smoke Intrusions		
	BLM ¹	Total	Days
1976 ²	--	--	--
1977	1	8	7
1978	0	12	9
1979	2	14	10
1980	2	21	19
1981	4	19	17
1982	2	16	14
1983	3	19	18
1984	2	18	16
1985	4	21	19
1986	3	14	12
1987	5	15	10
1988	3	17	12
1989	3	12	8
1990	0	10	9
1991	2	16	12
1992	0	10	7
1993	1	14	9

¹ BLM Salem District.

² No data for first year of baseline period.

Source: Oregon Department of Forestry 1977-1993.

As one indicator of smoke impacts, the Oregon Department of Forestry tracks smoke intrusions into designated areas (primarily population centers). The *Oregon Smoke Management Annual Report* (Oregon Department of Forestry 1992) displays the trend in intrusions from 1985 to 1992. The area burned and the number of intrusions per year have declined sharply in the early 1990s (see table 3-4).

The 1991 and 1992 smoke management reports also report PM₁₀ violations. The Oregon Department of Forestry analyzed burning and weather conditions for the dates of violations and concluded that forestry-related burning did not contribute to any violation in either year.

The Eugene/Springfield area is in violation of the national ambient air quality standards for PM₁₀. It is classified as a nonattainment area for this pollutant. Major sources of particulate matter within this area are smoke from woodstoves, dust, and industrial sources.

The pollutant most associated with the Salem District's resource management activities is PM₁₀ found in smoke produced by prescribed fire. Prescribed fire is used for site preparation, fuel hazard reduction, vegetation control, and to mimic natural disturbance processes. These activities in the district do not contribute significantly to PM₁₀ in the Eugene/Springfield area due to distance between the two areas.

Prescribed burning can adversely impact visibility in class I areas where excellent air quality is an important value. Special remote-area monitoring in Oregon during 1982 to 1984 showed that prescribed burning contributed 48 percent of the particulate pollution at one class I monitoring site and 41 percent at another, demonstrating that impacts can be significant.

Soils

Soils serve many functions such as storing and delivering water to streams and lakes and providing a medium for plant growth. A number of soil properties, including organic matter content, nutrients, texture, structure, porosity, and depth, are recognized as important for vegetation growth. Long-term soil productivity (i.e., a soil's ability to produce and maintain vegetation growth through time) is influenced by soil displacement, compaction, erosion, and organic matter removal. These actions can adversely affect a soil's ability to provide adequate moisture, aeration, nutrients, and anchorage, thereby, reducing vegetation growth potential.

Information on soil distribution and characteristics has been collected by the Soil Conservation Service and BLM soils scientists. The Soil Conservation Service has mapped soils in the district at a scale of 1:20,000. The Soil Conservation Service has provided detailed soil profile descriptions, texture classification, permeability, available water capacity, pH, and interpretations by soil series.

The Soil Conservation Service general soil map delineates large areas that have a distinctive pattern of soils, topography, and drainage. Each delineation, or soil association, is a unique natural landscape and consists of one or more major soils and some minor soils. Thirty-six soil associations occur on BLM-administered lands in the planning area. The soil associations were mapped using information regarding soil, temperature and precipitation, landform, and geologic data. A copy of the Soil Conservation Service general soils map and other more detailed soil information is available for review at the district office.

An intensive inventory known as the Timber Production Capability Classification System has been completed for the district with the exception of Table Rock Wilderness. It provides site-specific information concerning BLM-administered lands (see Timber Resources section). This information identifies fragile sites where the timber-growing potential is easily reduced due to inherent soil properties and landform characteristics. A summary of the Timber Production Capability Classification fragile codes is found in appendix G. Detailed information and classification descriptions are contained in the Salem District *Timber Production Capability Classification (TPCC) Technical Guide* (U.S. Department of the Interior, BLM, SDO 1987) and *Oregon TPCC Handbook 5251* (U.S. Department of the Interior, BLM, OSO 1988a).

Table 3-5 displays acres of fragile nonsuitable woodland sites. These sites are judged to be biologically and/or environmentally incapable of supporting a sustained yield of timber. They are removed from the commercial forest land base and managed for nontimber resources. Table 3-6 displays acreage of fragile suitable restricted lands which can be managed for timber production without reductions in timber-growing potential when best management practices are implemented.

The Timber Production Capability Classification inventory of the planning area identified 43,000 acres with more than 12 percent compacted soils caused by past management practices. Another 5,800 acres with nutrient limitations were identified that have been affected by past management activities.

Water Resources

Introduction

Management of BLM-administered water resources is guided by a number of basic principles, federal, and state laws, regulations and policies, and existing beneficial uses of water. The principles of management are based on the study of complex processes which transform precipitation to stream flow and/or ground water.

The federal Water Quality Act of 1987 directs federal agencies to meet state laws and regulations pertaining to beneficial uses of water identified by the state and applicable water quality requirements established to protect those uses. The state of Oregon has established a list of beneficial uses for each of the basins in the district (Oregon Administrative Rules 340-41-202, -242, -442, and -482) and applicable water quality requirements to provide protection for those uses. Oregon water quality requirements pertinent to BLM management in the planning area are contained in Oregon Administrative Rules 40-41-205, -245, -445, and -485, and Oregon Administrative Rules 340-41-026(1)(a).

The primary beneficial uses of water related to western Oregon forest land management activities are public and private domestic water supply, irrigation, fisheries, wildlife, recreation, and maintenance of aesthetic quality.

The *Oregon Water Management Program* (Oregon Water Resources Commission 1990) establishes statewide policies and principles pertaining to a wide

Table 3-5 Fragile Nonsuitable Woodland¹

Classification	Acres ²	Percent of BLM Forest Land Base
Soil Moisture	17,200	4.6
Nutrient	200	0.1
Slope Gradient	18,100	4.8
Mass Movement Potential	1,200	0.3
Surface Erosion Potential	7,900	2.1
Ground Water	5,200	1.4

¹ See appendix G and the *Oregon Timber Production Capability Classification Handbook 5251* (U.S. Department of the Interior, BLM, OSO 1988a) for a more detailed description of the lands.

² The acres in this column are not additive. Approximately 13,100 acres of nonsuitable woodlands have multiple classifications. The planning area has 36,700 acres or 9.7 percent of the forest land base in fragile nonsuitable woodlands.

Source: Western Oregon Digital Data Base.

Table 3-6 Fragile Suitable, Restricted¹

Classification	Acres ²	Percent of BLM Forest Land Base
Soil Moisture	83,000	22.0
Nutrient	62,100	16.5
Slope Gradient	24,200	6.4
Mass Movement Potential	18,400	4.9
Surface Erosion Potential	17,800	4.7
Ground Water	11,200	3.0

¹ See appendix G and the *Oregon Timber Production Capability Classification Handbook 5251* (U.S. Department of the Interior, BLM, OSO 1988a) for a more detailed description of the lands.

² The acres in this column are not additive. Approximately 54,600 acres of fragile-restricted have multiple classifications. The district has 162,000 acres or 43 percent of the forest land base in fragile suitable, restricted designation.

Source: Western Oregon Digital Data Base.

range of water-related topics. State policies pertaining to public land management include policies on Ground Water Management--June 1990, Instream Flow Protection--August 1990, and Protection of Water Resources on Public Riparian Lands--December 1990.

Watersheds

The planning area encompasses a large and diverse topographic area. It includes major portions of four state planning basins: the Willamette, Sandy, North Coast, and Mid-Coast. Water quality, quantity, and primary uses vary dramatically across the planning area.

Map 3-2 and table 3-7 display planning area analytical watershed locations and data. Analytical watersheds were identified by breaking down state planning basins and U.S. Geological Survey hydrologic units into major watersheds and sub-watersheds. Logical boundaries, such as smaller streams entering major streams, were used to delineate smaller watersheds.

Table 3-8 displays selected analytical watershed data for the planning area. The purpose for delineating selected analytical watersheds is to focus data compilation and impact assessment on those watersheds with potential high levels of BLM activity. Analytical watersheds with limited amounts of BLM-administered lands and activity are not analyzed in this proposed resource management plan. Activities in these watersheds will be addressed in future site-specific environmental assessments.

Selected analytical watersheds were chosen from major watersheds and sub watersheds. Criteria for selecting these watersheds were identified public concerns including Oregon Department of Environmental Quality designations for water quality limited streams (Oregon Department of Environmental Quality 1988a and 1990); 25 percent or more BLM-administered lands in the watershed; and a desire to select watersheds throughout the planning area.

Water Resources and Uses

Water yield and flow data for selected analytical watersheds in the planning area are displayed in table 3-9.

There are numerous small streams, springs, and ponds scattered over BLM-administered lands. Water quality is usually very high, providing a good source of water for a wide variety of uses. Many of the streams have headwaters on or adjacent to BLM-administered lands. Springs form the origin of streams or areas of discontinuous surface water. Slump ponds, associated with beaver activity and ponds formed by natural action of streams are scattered throughout the forest. Small streams, springs, and ponds provide water for community water systems and domestic use, fish and wildlife habitat, fighting fires, ground water recharge of riparian zones, and aesthetic beauty for enhancing recreational enjoyment.

Lakes and reservoirs that benefit from water draining from BLM-administered lands serve a variety of functions. Some lakes and reservoirs are used for intensive recreational activities and water storage to enhance fisheries, irrigation, and municipal water availability.

Wetlands provide multiple resource benefits for wildlife and serve as botanical habitats. Wetlands and hyporheic zones help moderate the flow of water and maintain the high quality of water flowing from BLM-administered lands. Wetlands with associated hyporheic zones were identified and mapped during the Timber Production Capability Classification process. Approximately 1,100 acres of surface water were designated as nonforest water or wet grass meadows. Areas with permanent high water tables (5,200 acres) were designated fragile water--unsuitable woodlands. Some 11,200 acres of wetlands with seasonally high water tables were mapped on the district and identified as fragile water--restricted.

Riparian ecosystems and their effects on water resources are described in the Riparian Zones section of this chapter.

Water uses related to BLM's land management activities are both consumptive and nonconsumptive. Consumptive uses include wildlife usage, road construction and maintenance, dust abatement, and fire suppression. Nonconsumptive uses include fisheries and recreation.

Table 3-7 Salem District Analytical Watersheds

State Planning Basin USGS Hydrologic Unit Major Watershed(5th) Subwatershed(6th)	Analytical Watershed Acres	BLM Acres	Percent BLM	State Planning Basin USGS Hydrologic Unit Major Watershed Subwatershed	Analytical Watershed Acres	BLM Acres	Percent BLM
Willamette Basin				Molalla-Pudding			
Upper Willamette				Molalla River			
73 Muddy Creek	101,400	5,500	5.4	87 Molalla Frontal	48,800	10,700	21.9
62 Marys River	90,500	1,300	1.4	88 North Fork Molalla	36,300	6,600	18.2
Luckiamute River				*90 Table Rock Fork	23,000	13,700	59.6
*59 Pedee Creek	7,700	2,100	27.6	*99 Upper Molalla River	22,500	10,800	48.3
58 Upper Luckiamute River	67,400	4,500	6.7	84 Milk Creek	61,400	3,600	5.8
56 Little Luckiamute River	35,000	1,700	5.0	Abiqua Creek			
				92 Abiqua Creek	31,500	1,800	5.7
North Santiam				91 Butte Creek	30,900	3,800	12.4
95 Little N Fk Santiam	70,900	13,200	18.7	Rock Creek			
North Santiam River				86 Rock Creek (Pudding)	24,900	1,400	5.5
96 N Santiam Frontal	106,900	7,600	7.1				
South Santiam				Tualatin			
102 Upper South Santiam	189,600	300	0.1	Tualatin River			
Middle Santiam River				23 Scoggins Creek	25,200	1,300	5.1
*99 Quartzville Creek	64,000	21,200	33.1	22 Lee Creek	24,400	2,500	10.2
101 Lower Middle Santiam	69,500	10,400	15.0	24 Tualatin Frontal	32,100	30	0.1
100 Hamilton McDowell	42,700	4,600	10.8	7 Dairy Creek	105,100	4,000	3.8
98 Crabtree Creek	94,400	17,900	19.0	8 East Fork Dairy Creek	25,800	3,800	14.7
97 Thomas Creek	74,700	12,300	16.5	12 McKay Creek	40,900	2,500	6.1
				11 Upper McKay Creek	25,000	2,500	10.0
Middle Willamette				Clackamas			
Fickreall Creek				Hot Springs Fork Collawash			
*52 Upper Fickreall Creek	6,800	2,200	32.6	94 Hot Springs Fork	24,600	900	3.7
53 Lower Fickreall Creek	15,000	1,200	7.8	Clackamas River			
Abernathy Creek				82 Clackamas Frontal	5,100	1,000	19.6
80 Abernathy Creek	10,900	300	2.5	83 North Fork Clackamas	20,300	600	3.1
				85 South Fork Clackamas	17,200	2,900	16.9
Yamhill				89 Fish Creek	30,200	400	1.2
42 Upper South Yamhill	86,300	3,600	4.2	79 Eagle Creek	49,700	4,000	8.0
45 Rock Creek (Yamhill)	11,600	300	2.5	81 Clear Creek (Clack)	39,600	4,500	11.4
*46 Rowell-Gold Creek	10,600	3,100	29.6	Deep Creek			
Willamina Creek				78 Deep Creek	5,700	500	8.5
*33 Upper Willamina	25,500	11,200	44.1	10 L Willamette Frontal	9,300	300	3.5
40 Coast Creek	14,400	2,900	20.4	Scappoose River			
43 Willamina Frontal	13,300	1,200	9.0	4 Milton Creek	19,800	300	1.4
South Yamhill River				6 Mult Channel Frontal	11,900	40	0.3
39 Deer Creek	12,300	1,500	11.8	5 North Fork Scappoose	20,500	2,900	14.3
*51 Mill Creek	22,100	9,600	43.3	9 South Fork Scappoose	17,300	3,000	17.1
*47 Gooseneck Creek	6,200	2,700	43.8				
34 Panther Creek	35,400	3,900	10.8				
North Yamhill							
29 North Yamhill River	109,900	12,900	11.7				
28 Upper North Yamhill	41,700	9,100	21.8				

* Selected Analytical Watersheds

Numbers preceding major and subwatersheds are references to location on map 3-2.

USGS = U.S. Geological Survey

Source: Western Oregon Digital Data Base.

Table 3-7 Salem District Analytical Watersheds (continued)

State Planning Basin USGS Hydrologic Unit Major Watershed(6th) Subwatershed(6th)	Analytical Watershed Acres	BLM Acres	Percent BLM	State Planning Basin USGS Hydrologic Unit Major Watershed Subwatershed	Analytical Watershed Acres	BLM Acres	Percent BLM
North Coast Basin				Sandy Basin			
Lower Columbia-Clatskanie				Lower Columbia-Sandy			
3 Clatskanie	24,000	800	3.4	Sandy Frontal	81,600	8,100	9.9
Nehalem				Bull Run River	31,100	100	0.2
1 Nehalem River	632,300	4,500	0.7	Mid Coast Basin			
*2 East Fork Nehalem	14,200	4,400	30.6	Siletz-Yaquina			
Wilson-Trask-Nestucca				44 Salmon River	40,700	2,900	7.1
13 Kilchis River	41,300	2,900	7.1	49 Drift Creek (Siletz)	21,800	1,900	8.6
16 Little So Fk Kilchis	7,600	700	9.5	48 Schooner Creek	26,300	400	1.5
*17 Clear Ck (Kilchis)	2,800	1,300	47.3	54 Siletz River	191,600	14,200	7.4
*15 Kilchis Frontal	2,800	900	30.3	*50 North Fork Siletz	25,300	10,100	40.1
14 Wilson River	121,200	3,500	2.9	55 South Fork Siletz	14,400	2,000	13.6
18 Little N Fk Wilson	12,600	1,800	14.3	57 Rock Creek (Siletz)	26,800	1,400	5.2
19 Wilson Frontal	10,500	1,700	16.4	Yaquina River			
Trask River				61 Elk Creek (Yaquina)	22,200	2,100	9.3
20 Trask Frontal	13,200	2,300	17.6	60 Yaquina River	172,100	1,100	0.7
21 North Fork Trask	51,200	5,700	11.1	Alsea			
27 South Fork Trask	33,500	900	2.6	Alsea River			
Tillamook River				*69 Crooked Creek	9,900	4,400	44.7
25 Munson Creek	1,800	200	12.3	*68 North Fork Alsea	20,700	12,000	57.9
Nestucca River				*67 Fall Creek	19,200	5,800	30.2
*41 Upper Nestucca	16,600	11,200	67.7	*72 Upper So Fk Alsea	19,700	12,600	63.8
*32 Elk Creek (Nestucca)	6,300	5,100	81.1	*71 Lower So Fk Alsea	11,900	6,100	51.5
*31 Bear Creek	3,900	3,200	81.4	*70 Alsea Frontal	41,300	14,200	34.4
*37 Testament Creek	4,400	2,900	66.0	63 N Alsea Pacific	34,400	400	1.0
*36 Bible Creek	4,800	2,200	46.3	64 Drift Creek (Alsea)	44,400	1,200	2.8
*30 Moon Creek	12,600	5,400	42.8	65 Alsea Bay	43,600	700	1.6
26 Beaver Creek	18,600	1,800	9.6	Lobster Creek			
35 Nestucca Frontal	47,900	4,500	9.4	*75 Upper Lobster	9,100	8,100	89.2
41 Little Nestucca	35,500	200	0.5	*74 Lower Lobster	18,500	6,900	37.0
				66 Yachats Pacific	40,500	100	0.3

* Selected Analytical Watersheds

Source: Western Oregon Digital Data Base.

Table 3-8 Selected Analytical Watersheds

Watershed Name	Analytical Watershed Acres	Percent BLM	Stream Order	Total Stream Miles	Miles of Stream on BLM Lands	Watershed Name	Analytical Watershed Acres	Percent BLM	Stream Order	Total Stream Miles	Miles of Stream on BLM Lands
Alsea Frontal	41,300	34	1&2	217.1	65.3	Gooseneck Creek	6,200	44	1&2	34.9	15.8
			3	40.5	10.5				3	9.9	3.9
			4	25.2	7.1				4	0.6	0.3
			5	7.1	0.2				5	0.0	0.0
			6&7	22.8	0.8				6	0.0	0.0
			L	1.5	0.1				L	0.0	0.0
Bear Creek (Yamhill)	3,900	81	1&2	20.5	14.8	Kilchis Frontal	2,800	31	1&2	23.9	8.5
			3	3.4	2.4				3	3.6	0.5
			4	4.2	2.3				4	0.9	0.0
			5	0.0	0.0				5	0.0	0.0
			6	0.0	0.0				6	5.3	0.0
			L	0.0	0.0				L	0.0	0.0
Bible Creek	4,800	46	1&2	18.4	8.9	Lower Lobster	18,500	37	1&2	119.4	16.8
			3	5.5	1.7				3	16.6	2.4
			4	3.9	2.0				4	7.1	1.4
			5	0.9	0.0				5	2.6	0.5
			6	0.0	0.0				6	8.2	0.0
			L	0.3	0.2				L	0.9	0.2
Clear Creek (Kilchis)	2,800	48	1&2	22.9	12.2	Lower So Fk Alsea	11,900	51	1&2	47.1	18.4
			3	4.4	2.1				3	13.4	6.0
			4	1.3	0.2				4	8.4	4.8
			5	2.0	0.0				5	2.4	0.7
			6	0.0	0.0				6	7.3	1.4
			L	0.0	0.0				L	0.4	0.0
Crooked Creek	9,900	45	1&2	41.1	18.6	Mill Creek	22,100	43	1&2	91.6	40.7
			3	16.0	7.6				3	23.6	10.3
			4	9.2	2.7				4	9.9	1.6
			5	4.0	0.2				5	3.2	0.4
			6	0.0	0.0				6	9.4	2.2
			L	0.0	0.0				L	0.8	0.0
East Fork Nehalem	14,200	31	1&2	53.9	14.7	Moon Creek	12,600	43	1&2	44.8	23.8
			3	17.1	5.6				3	9.3	6.2
			4	7.0	2.7				4	4.1	3.6
			5	5.8	0.8				5	4.8	2.1
			6	0.0	0.0				6	0.0	0.0
			L	0.7	0.3				L	0.0	0.0

Table 3-8 Selected Analytical Watersheds (continued)

Watershed Name	Analytical Watershed Acres	Percent BLM	Stream Order	Total Stream Miles	Miles of Stream on BLM Lands	Watershed Name	Analytical Watershed Acres	Percent BLM	Stream Order	Total Stream Miles	Miles of Stream on BLM Lands
Elk Creek (Nestucca)	6,300	81	1&2	26.7	19.8	North Fork Alsea	20,700	58	1&2	94.2	52.2
			3	7.6	6.0				3	23.3	13.9
			4	5.0	4.8				4	13.7	7.3
			5	5.6	4.6				5	4.3	1.3
			6	0.0	0.0				6	9.8	4.8
Fall Creek	19,200	30	L	0.1	0.1	Upper Molalla River	22,500	48	L	1.1	0.0
			1&2	105.4	28.0				1&2	144.1	69.5
			3	23.6	6.6				3	25.3	11.1
			4	11.8	2.4				4	6.7	5.1
			5	5.4	1.2				5	4.3	1.1
North Fork Siletz	25,300	40	6	0.0	0.0	Upper Nestucca	16,600	68	6	7.3	4.0
			L	0.0	0.0				L	0.1	0.0
			1&2	95.7	28.4				1&2	205.8	144.8
			3	28.0	9.4				3	23.5	16.8
			4	22.4	8.0				4	11.3	8.1
Pedee Creek	7,700	28	5	7.7	5.2	Upper Rickreall Creek	6,800	33	5	15.6	11.0
			6	2.2	0.7				L	5.5	0.4
			L	0.5	0.2				1&2	29.0	10.2
			1&2	29.6	8.5				3	6.4	2.0
			3	10.0	4.4				4	6.8	3.3
Quartzville Creek	64,000	33	4	5.1	1.1	Upper South Fork Alsea	19,700	64	5	3.5	0.8
			5	3.1	0.0				6	0.3	0.1
			6	0.0	0.0				L	0.0	0.0
			L	0.5	0.0				1&2	77.2	35.1
			1&2	187.6	78.2				3	19.3	9.1
Rowell-Gold Creek	10,600	30	3	43.7	17.6	Table Rock Fork	22,600	61	4	15.2	8.8
			4	11.7	3.9				5	6.8	3.4
			5	13.3	1.9				6	3.6	2.3
			6	28.4	7.0				L	0.1	0.0
			L	0.0	0.0				1&2	157.9	85.1
			1&2	39.4	10.5				3	18.8	9.4
			3	19.0	4.9				4	8.1	2.5
			4	3.8	0.3				5	12.7	6.0
			5	0.0	0.0				6	0.0	0.0
			6	0.0	0.0				L	0.0	0.0
			L	0.0	0.0						

Table 3-8 Selected Analytical Watersheds (continued)

Watershed Name	Analytical Watershed Acres	Percent BLM	Stream Order	Total Stream Miles	Miles of Stream on BLM Lands
Testament Creek	4,400	66	1&2	33.2	23.8
			3	2.7	1.9
			4	5.9	3.3
			5	0.0	0.0
			6	0.0	0.0
			L	0.5	0.0
Upper Lobster	9,100	89	1&2	42.4	6.5
			3	6.8	0.9
			4	5.0	0.2
			5	2.9	0.0
			6	2.5	0.0
			L	0.0	0.0
Upper Willamina	25,500	44	1&2	282.9	123.0
			3	37.8	18.5
			4	15.1	6.1
			5	7.0	2.8
			5	7.0	2.8
			L	2.5	1.0

L = Lake; mileage shown for L is shoreline miles.

Source: Western Oregon Digital Data Base.

Table 3-9 Water Yield and Flow Data for Selected Analytical Watersheds

Watershed Name	Average Annual Precipitation (inches) ¹	Annual Yield (inches) ²	Average Annual Flow (cfs)	25-year Flood (cfs) ³	Average Minimum Flow (cfs) ²
Alsea Frontal	85	60.57	288.01	11,296.2	80.94
Bear Creek (Yamhill)	110	82.23	36.90	1,652.8	15.81
Bible Creek	100	82.23	45.07	1,797.9	19.30
Clear Creek (Kilchis)	105	90.47	29.50	960.5	17.19
Crooked Creek	100	60.57	68.97	2,652.8	19.38
East Fork Nehalem	60	55.52	91.03	1,347.3	35.47
Elk Creek (Nestucca)	115	82.23	59.86	2,592.2	25.64
Fall Creek	100	60.57	133.81	6,122.5	37.61
Gooseneck Creek	90	47.83	34.25	1,487.7	8.93
Kilchis Frontal	100	90.47	29.30	665.5	17.07
Lower Lobster	90	66.23	141.39	5,304.2	44.23
Lower South Fork Alsea	80	60.57	82.87	3,243.1	23.29
Mill Creek	100	69.39	176.21	5,361.6	113.23
Moon Creek	105	82.23	119.21	4,758.4	51.06
North Fork Alsea	100	60.57	144.10	5,987.2	40.50
North Fork Siletz	190	104.94	305.85	15,072.8	129.26
Pedee Creek	65	39.12	34.59	2,183.2	7.85
Quartzville Creek	110	92.54	682.16	15,822.0	313.71
Rowell-Gold Creek	110	63.61	77.68	3,252.9	26.80
Table Rock Fork	90	76.16	201.25	4,725.3	89.12
Testament Creek	145	82.23	41.72	1,616.1	17.87
Upper Lobster	100	66.23	69.06	3,044.7	21.60
Upper Molalla River	110	76.16	196.97	5,449.1	87.23
Upper Nestucca	110	82.23	157.05	3,047.2	67.26
Upper Rickreall Creek	120	73.35	57.23	2,498.3	15.07
Upper South Fork Alsea	65	60.57	137.53	3,848.0	38.65
Upper Willamina	85	54.78	160.70	6,650.2	51.09

cfs = cubic feet per second

Sources:

¹ Mean Annual Precipitation Map 1930-1957.² U.S. Geological Survey open file report 84-454.³ Calculated using BLM technical note 374 (Butler 1986) and acres in analytical watersheds (Western Oregon Digital Data Base).

Numerous domestic and irrigation water rights have been filed on and near BLM-administered lands. A listing of these diversions is maintained by the Oregon Water Resources Department. Many streams have been fully appropriated during summer low flow months. Map 3-3 displays community watersheds which encompass BLM-administered lands and table 3-10 shows community water systems data.

There are four outstanding natural resource waters on the district. They are the Clackamas, Sandy, and Salmon rivers, and Quartzville Creek. These are designated federal wild and scenic rivers.

Ground water is used throughout the planning area for irrigation, domestic, and municipal uses. Ground water use and concerns are greatest in areas having a high level of development. These areas are primarily in the Willamette Valley. The Oregon Water Resources Department is drafting ground water management rules for the Willamette Basin. It will list critical ground water areas, areas of stressed aquifers, and areas with water quality problems.

The only wells on BLM-administered lands are at recreation sites and the Horning Tree Seed Orchard. Twenty of 26 wells are being used. Testing is completed monthly on all active use wells. The well at the former Little Bend Recreation Site has high levels of coliform bacteria. It is no longer available for use. The well at Alsea Falls Recreation Site has high mineral levels. An alternate surface water collection system is being used.

Water Quality

Disturbance of erosive soils can have a significant adverse effect on water quality by accelerating sediment delivery into waterways. These soils are identified as fragile sites in the Timber Production Capability Classification (see Soils section and appendix G).

The Oregon Department of Environmental Quality is evaluating many water bodies to determine if they are water quality limited (Oregon Department of Environmental Quality 1992). In the planning area, water bodies identified as water quality limited are:

Tualatin River: Quality of water may affect aquatic life, aesthetics, water-contact recreation, and fishing. Water quality standards were violated for the following parameters: dissolved oxygen, ammonia, and chlorine toxicity. Total maximum daily loads have been set for phosphorus, ammonia, and nitrogen.

Suspected sources of pollution include sewage treatment plants, confined animal feeding operations, urban runoff, agriculture, forestry, and natural background levels. Salem District analytical watersheds that are tributary to the Tualatin River include: Scoggins Creek, Lee Creek, Tualatin Frontal, East Fork Dairy Creek, Dairy Creek, Upper McKay Creek, and McKay Creek.

Yamhill River: Quality of water may affect aquatic life, aesthetics and water-contact recreation due to fecal bacteria, turbidity, and pH. Total maximum daily loads have been set for phosphorus. Suspected sources of pollution are sewage treatment plants. Salem District analytical watersheds that are tributary to the Yamhill River include: Rock Creek, Rowell-Gold Creek, Upper South Yamhill, Upper Willamina, Coast Creek, Willamina Frontal, Deer Creek, Mill Creek, Gooseneck Creek, and Panther Creek.

Pudding River: Water quality may affect aquatic life due to a lack of dissolved oxygen and excessive fecal bacteria. Total maximum daily loads have been set for biological oxygen demand. Suspected sources of pollution are sewage treatment plants, industry, agriculture, and other. Salem District analytical watersheds that are tributary to the Pudding River include: Abiqua Creek, Butte Creek, and Rock Creek (Pudding).

Columbia Slough: Water quality may affect aquatic life, water-contact recreation, fishing, and aesthetics due to fecal bacteria, organics, metals, toxins, and pH. Total maximum daily loads have been established for bacteria, phosphorus, and toxins. Suspected sources of pollution are combined sewer overflow, urban runoff, landfills, and cesspools.

Rickreall Creek: Quality of water may affect aquatic life due to lack of dissolved oxygen. Total maximum daily loads have been set for biological oxygen demand. Suspected sources of pollution include sewage treatment plants and agriculture. Both the Upper Rickreall Creek and Lower Rickreall Creek analytical watersheds are tributary to the water quality limited sections of Rickreall Creek.

Main stems of the Willamette and Columbia Rivers: Quality of water may affect aquatic life and fishing. Water quality standards have been violated and total maximum daily loads set for 2,3,7,8-TCDD. Suspected sources of pollution include bleach-kraft mills, wood-treating facilities, sewage treatment plants, agriculture, and urban runoff. All Salem District analytical watersheds in the Willamette Basin are tributary to the main stems of the Willamette and Columbia rivers. In addition, the analytical watersheds in the Sandy Basin are tributary to the main stem of the Columbia River (see table 3-7).

Table 3-10 Community Water Systems

System Name	Source Name	Population Served	Filter	Watershed Area (acres)		
				BLM	Other	Total
Albany	South Santiam River	33,600	Yes	35,910	402,930	438,840
Alder Creek Barlow	Alder Creek	250	Yes	260	1,080	1,340
Amity	South Yamhill River	1,130	Yes	30,930	165,610	196,540
Bear Cr Hildeout	Callow Creek	100	Yes	80	1,990	2,070
Beaver W.D.-01	Beaver Creek	400	Yes	1,790	16,440	18,230
Brownsville	Calapoola River	1,250	No	5,090	92,900	97,990
Canby Utility	Molalla River	6,200	Yes	46,230	173,040	219,270
Carlton	Panther Creek	1,570	Yes	1,110	1,060	2,170
Clackamas W.D.	Clackamas River	20,000	Yes	14,980	369,770	384,750
Colton W.D.	Jackson Creek	1,000	Yes	510	1,570	2,080
Corbett W.D.-01	North Fork Gordon Creek	2,300	No	10	810	820
Corbett W.D.-02	North Fork Gordon Creek	2,300	No	80	680	760
Corvallis-01	Griffith Creek	45,000	Yes	0	1,210	1,210
Corvallis-02	South Fork Rock Creek	45,000	Yes	20	3,390	3,390
Corvallis-03	North Fork Rock Creek	45,000	Yes	0	1,550	1,550
Dallas	Rickreall Creek	8,950	Yes	3,310	15,080	18,390
Depoe Bay W.D.-01	North Depoe Bay Creek	785	Yes	0	650	650
Depoe Bay W.D.-02	South Depoe Bay Creek	785	Yes	10	740	750
Estacada	Clackamas River	1,910	Yes	5,900	212,640	218,540
Fairview-02	Donaldson Creek	1,864	No	0	170	170
Fairview-03	Hughey Creek	1,864	No	10	640	650
Falls City-01	Teal Creek	850	No	140	2,170	2,310
Gates	North Santiam River	350	Yes	2,530	186,090	188,620
Hillsboro Cherry G.	Upper Tualatin River	250	No	750	14,430	15,180
Hillsboro F. Grove	Tualatin River	35,000	Yes	3,900	126,020	129,920
Jefferson	Santiam River	1,140	Yes	87,350	933,830	1,021,180
K.G. & L. Beach	Drift Creek	2,500	No	1,870	20,480	22,350
Lake Oswego M.W.	Clackamas River	26,985	Yes	14,980	372,400	387,380
Lebanon	South Santiam River	12,000	Yes	35,910	400,510	436,420
Lyons Mehema W.D.	North Santiam River	1,650	No	19,670	278,940	298,610
McMinnville-H	Haskins Creek	15,000	Yes	50	3,930	3,980
McMinnville-N	Nestucca River	15,000	Yes	850	1,290	2,140
McMinnville-W	Walker Creek	15,000	Yes	1,080	750	1,830
Mill City	North Santiam River	1,500	Yes	4,350	203,780	208,130
Molalla	Molalla River	3,200	Yes	42,720	86,740	129,460
Monmouth	Teal Creek	5,725	No	180	2,180	2,360
Oregon City-01	South Fork Clackamas River	14,500	Yes	2,100	7,450	9,550
Oregon City-02	Memaloose Creek (Emergency)	14,500	Yes	580	6,810	7,390
Oregon City-03	Clackamas River	14,500	Yes	14,980	371,920	386,900
Panther Creek W.D.	Panther Creek	600	No	90	1,240	1,270
Philomath	Mary's River	2,800	Yes	2,050	90,890	92,940
Portland Bureau W.W.	Bull Run River	400,000	No	90	27,480	27,570
Rose Lodge Water Co.	Slick Rock Creek	240	Yes	1,350	2,710	4,060
Salem Public Works	North Santiam River	116,500	Yes	20,300	294,030	314,330
Sandy	Alder Creek	4,000	Yes	370	3,210	3,580
Scappoose-01	South Scappoose Creek	3,300	Yes	1,920	2,730	4,650
Scappoose-02	Gourlay Creek	3,300	Yes	550	1,300	1,850
Scappoose-03	Lazy Creek (Emergency)	3,300	Yes	340	290	630
Scotts Mills W.D.-02	Butte Creek	290	Yes	3,120	25,450	28,570
Sheridan-0102	La Toutena Mary / Kegbine Sprs.	2,200	No	20	80	100
Sheridan-03	Baltimore Creek	2,200	No	140	200	340
Sheridan-04	South Yamhill River	2,200	Yes	30,930	148,060	178,990
Siletz-01	Siletz River	1,000	Yes	13,520	118,190	131,710
Siletz-02	Tangerman Creek	1,000	Yes	0	330	330
Silverton-01	Abiqua Creek	5,480	Yes	1,840	29,840	31,680
Silverton-02	Silver Creek	5,480	Yes	250	28,700	28,950
Stayton	North Santiam River	4,785	Yes	20,300	298,580	318,880
Sweet Home	South Santiam River	6,750	Yes	31,370	335,760	367,130
Tillamook	Fawcett Creek	5,000	No	0	3,380	3,380
Toledo W.U.-01	Siletz River	3,200	Yes	13,520	118,540	132,060
Toledo W.U.-02	Mill Creek	3,200	Yes	0	1,100	1,100
Waldport-03	Eckman Creek	1,542	Yes	290	2,920	3,210
Willamina-01	Willamina Creek	1,760	Yes	15,260	37,030	52,290
Yamhill	Turner Creek	875	Yes	1,120	1,870	2,990

Sources: Western Oregon Digital Data Base and data supplied by Oregon Water Resources Department.

In addition, the Oregon Department of Environmental Quality has completed an assessment report of nonpoint sources of water pollution in the state (Oregon Department of Environmental Quality 1988a). Water quality information was collected from a number of sources and categorized by source of information and severity of perceived pollution on identified beneficial uses.

In addition to the designated water quality limited streams, the following streams and water bodies have been identified as having water quality limitations which may affect identified beneficial uses:

North Coast Basin

Nehalem Bay	Miami River
North Fork Nehalem River	Kilchis River
Murphy Creek	Wilson River
Trask River	Hoquarten Slough
Tillamook River	Bewley Creek
Killiam Creek	Mills Creek
Tillamook Bay (Upper Bay)	

Mid Coast Basin

Yaquina River	Nutes Slough
---------------	--------------

Willamette Basin

Mary's River	Calapoolia River
Luckiamute River	Bashaw Creek
Santiam River	North Yamhill River
South Yamhill River	Willamina Creek
Mill Creek	Deer Creek
Salt Creek	Little Pudding River
Zollner Creek	Scoggins Creek
Gales Creek	McKay Creek
Dairy Creek	Beaverton Creek
Rock Creek	Fenno Creek
Lake Oswego Canal	Springbrook Creek
Johnson Creek	Swan Island Channel

Sandy Basin

Sandy River	Little Sandy Creek
Sandy River, Muddy Fork	Cedar Creek

Source: Oregon Department of Environmental Quality 1992

The condition of a stream channel has a significant effect on downstream water quality and various beneficial uses. Because of the variety of beneficial uses within each analytical watershed, there is no best set of stream channel conditions. Certain conditions, however, are usually indicators of a healthy stream environment for most uses. These conditions include stable stream banks and bottom, an abundance of stable, large woody debris, and a healthy riparian ecosystem.

Large woody debris is very important to the proper functioning of streams and rivers. Besides providing habitat for aquatic organisms this material regulates flow, reduces flooding, increases low flows, and traps sediment thus preventing erosion. From 1970 until the early 1980s, Salem District policy was to remove woody debris from streams. Thus many of the streams in all watersheds lack adequate large woody debris.

Two types of events have affected stream channels. The first is debris torrents from landslides which scour stream channels down to bedrock and destroy much of the riparian vegetation (At the same time, landslides in the range of natural variability have historically been an important source of large woody debris and structure to streams). The second was the use of splash dams at the beginning of this century. This method of transporting logs consisted of building a dam on a stream. Then, during a storm, the dam was broken, sending tons of logs downstream and scouring the stream channel. Many streams have not recovered from this practice. Forest management activities, especially those that cause soil disturbance (e.g., tractor logging, roads, and slash piling), can cause debris torrents and changes in streamflows which in turn can change sediment rates.

Annual monitoring of selected projects for effectiveness of water protection measures and impacts on water quality was required in the 1983 timber management records of decision. In addition to records of decision monitoring, the district has monitored water quality impacts in special project and sensitive areas. From 1984 to the present, records of decision monitoring has been accomplished through environmental assessment compliance checks. Part of this monitoring evaluated whether watershed protection measures were implemented as identified in environmental assessments and whether identified protection measures were effective in achieving desired goals. The results show that water protection measures were implemented and goals achieved for most of the district's timber sales. Where monitoring indicated problems with meeting water quality protection goals, monitoring results were used to correct problems and modify design features in new projects.

General Watershed Conditions

The general condition of a watershed refers to its ability to function in a way that will deliver a regulated amount of high quality water. There is no consistent measure of watershed condition. However, certain parameters are generally accepted as necessary for proper functioning. These parameters include deep permeable soils, healthy riparian ecosystems, abundant vegetation, and lack of pollution sources.

An aerial photo inventory of watershed vegetation and physical conditions was completed for the 27 selected analytical watersheds using 1988 photos. A line intersect method was used to identify riparian vegetation classes along streams. A point intersect method (approximately one point per 10 to 15 acres) was used to identify physical characteristics. This inventory plus other available information was used as the basis to identify the current general condition of the selected analytical watersheds.

Benton County

The selected analytical watersheds in Benton County are Alsea Frontal, Crooked Creek, Fall Creek, Lower Lobster, Upper Lobster, North Fork Alsea, Lower South Fork Alsea, and Upper South Fork Alsea. These watersheds are in the best total condition of any in the district.

The key concerns in this grouping of watersheds are:

- The high amount of Alsea Frontal watershed in areas of meadows, pastures, shrubs, young forests and areas with over 20 percent exposed soils. These conditions make the watershed highly susceptible to erosive forces such as rain, overland flow and landslides.
- The high amount of Upper Lobster watershed with riparian zones that are predominately young timber, shrubs or openings. The lack of established riparian vegetation does not provide erosion protection, shading, streambank stability, and structure for current and future aquatic needs.
- The very high drainage density in the Fall Creek watershed which indicates a high potential for erosion.
- The very high percentage of most of these watersheds with mapped unstable soils.

Polk and Lincoln Counties

The selected analytical watersheds in Polk and Lincoln counties consist of: Gooseneck Creek, Mill Creek, North Fork Siletz, Pedee Creek, Rowell-Gold

Creek, Upper Rickreall Creek. These watersheds may be in worse overall condition when compared to the other watershed groupings found in the Salem District.

The key concerns in this grouping of watersheds are:

- The high amount and very high amount of Rowell-Gold Creek and Pedee Creek watersheds respectively that are impacted by roads, skid trails and other disturbances which result in increased peak flows and erosion rates.
- The high amount of Gooseneck Creek, Pedee Creek, and Rowell-Gold Creek watersheds in areas of meadows, pastures, shrubs, young forests and areas with over 20 percent exposed soils. These conditions make the watershed highly susceptible to erosive forces such as rain, overland flow, and landslides.
- The high amount of Pedee Creek, Rowell-Gold Creek, and Upper Rickreall Creek watersheds impacted by tractor piling operations which increase compaction, disturbance, peak flows, and erosion rates.
- The very high amount of Pedee Creek watershed with riparian zones of predominately young timber, shrubs or other openings. The lack of established riparian vegetation does not provide erosion protection, shading, streambank stability, and structure for current and future aquatic needs.
- The high erodibility of soils in the Gooseneck Creek watershed.
- The high amount of the North Fork Siletz and Upper Rickreall Creek watersheds with slopes greater than 60 percent and/or BLM-administered lands mapped as critical slopes.
- The high drainage density in the Gooseneck Creek and Rowell-Gold Creek watersheds which indicates high potential for erosion.
- The high precipitation and stream flow for Upper Rickreall Creek and North Fork Siletz, indicating high erosion potential in these watersheds.
- The very high percentage of most of these watersheds with mapped unstable soils.
- The high amount of harvestable timber, based on 1988 data, identified on private lands in the North Fork Siletz (26 percent), Mill Creek (37 percent), Upper Rickreall Creek (42 percent) and 45 percent in the Pedee Creek watershed. Since this date, accelerated harvesting has occurred on many private lands. This may have created a decrease in the general condition of these watersheds.

Tillamook and Yamhill Counties

The selected analytical watersheds in Tillamook and Yamhill Counties are: Bear Creek, Bible Creek, Clear Creek (Kilchis), Elk Creek (Nestucca), Kilchis Frontal, Moon Creek, Testament Creek, Upper Nestucca, Upper Willamina.

The key concerns in this grouping of watersheds are:

- The high amount of the Testament Creek watershed in areas of meadows, pastures, shrubs, young forests and areas with over 20 percent exposed soils. These conditions make the watershed highly susceptible to erosive forces such as rain, overland flow, and landslides.
- The high erodibility of soils in the Bible Creek, Clear Creek, and Moon Creek watersheds and the very high erodibility of soils in the Kilchis Frontal watershed.
- The high and very high percentage of the Clear Creek (Kilchis) and Moon Creek watersheds respectively with slopes greater than 60 percent and/or BLM-administered lands with mapped critical slopes.
- The high drainage density in the Kilchis Frontal, Upper Nestucca, and Upper Willamina watersheds which indicates high potentials for erosion.
- The high precipitation and flow rates for the Elk Creek (Nestucca) watershed indicating a high erosive potential in this watershed.
- The very high percentage of most of these watersheds with mapped unstable soils.

Washington and Columbia Counties

The East Fork (Nehalem) is the only selected analytical watershed in Washington and Columbia counties. This watershed is considered to be in better overall condition than over half of the selected analytical watersheds on the district.

The precipitation, flow and landslide rates for this watershed are low indicating low erosive forces and low susceptibility to landsliding.

The key concerns in this watershed are:

- The high amount of land impacted by roads, skid trails and other disturbances which result in increased peak flows and erosion rates.
- The high amount in areas of meadows, pastures, shrubs, young forests and areas with over 20 percent exposed soils. These conditions make the watershed highly susceptible to erosive forces such as rain, overland flow, and landslides.

- The very high amount of land impacted by tractor piling operations which increase compaction, disturbance, peak flows, and erosion rates.
- The very high erodibility of the soils.

Clackamas County

The selected analytical watersheds in Clackamas County are the Upper Molalla and the Table Rock Fork. These two watersheds are in good overall condition. Physical conditions are similar.

The key concerns in these two watersheds are:

- The high amount of the Upper Molalla River watershed that is impacted by roads, skid trails and other disturbances which cause increased peak flows and erosion rates.
- The very high amount of the Upper Molalla River watershed in areas of meadows, pastures, shrubs, young forests and areas with over 20 percent exposed soils. These conditions make the watershed highly susceptible to erosive forces such as rain, overland flow, and landslides.
- The high amount of both watersheds with slopes greater than 60 percent and/or BLM-administered lands with mapped critical slopes.
- The very high percentage of most of these watersheds with mapped unstable soils.

Linn County

The Quartzville Creek analytical watershed (64,000 acres) in Linn County is the largest of the Salem District's selected analytical watersheds. In addition to size, it is distinct from the other selected analytical watersheds due to a large percentage of unstable soils, steep slopes, and mapped critical slopes on BLM-administered lands. It is the only watershed in the district with a significant amount of placer mining activity. On the upper portions of the watershed, administered by the Forest Service, there are 30 placer claims where stream dredges are used. There are two claims currently operating under plans of operation; both create significant water quality concerns.

The lower portion of the Quartzville Creek drainage is administered by the BLM. It is a federally designated recreational river. Recreational mining, which is allowed under the designation, is conducted using small dredging equipment and hand tools. This activity in the stream causes a continual disruption of streambed gravels which, together with a lack of large woody debris to provide stream structure, reduces the stream's ability to accumulate the spawning gravels and cover needed for many aquatic organisms and fish to thrive.

Biological Diversity and Ecological Health

Introduction

Biological diversity provides the natural resources and ecological processes necessary for long-term survival of organisms. Ecological health is dependent on biological diversity (Blockstein 1989). A baseline for ecological health analysis is the range of pre-management or historic conditions of hydrologic functions and landscape composition. This range of natural variability is difficult to quantify, is known to have changed with changes in climate, and will continue to shift as conditions change.

In this section, biological diversity on BLM-administered lands is described in terms of the following components: genetic diversity; species diversity; ecosystem diversity; ecological health; and landscape diversity. See the Wildlife section for an expanded discussion of wildlife populations and the interactions between animals and habitat.

Genetic Diversity

The level of genetic diversity may be characterized in terms of variation in genetic composition from the landscape level to the forest stand and individual species level. More than 1,000 invertebrate species, each with a distinct set of genetic characteristics, have been identified within a single old-growth forest stand (Franklin 1988). The number of genes within a species can range from 1,000 in bacteria, to 10,000 in fungi, to 400,000 or more in flowering plants (Wilson 1988).

The principal risks to genetic diversity include habitat fragmentation, which limits or prevents genetic interchange, and habitat loss with its consequent reductions in plant and animal populations or loss of species. Specific impacts of past forest management on genetic diversity are uncertain. However, all silvicultural actions affect genetic composition to some degree (Ledig and Smith 1981).

The genetic diversity of animals is critical to the continuing evolution of species (Harris 1984). According to Harris, evolution can only proceed adaptively if there is sufficient genetic variability. This will allow natural selective forces to discriminate between adaptive and maladaptive traits. Thus, Harris concludes, species conservation should be

achieved before they become nearly extinct. If species are near extinction, they have lost a significant portion of their genetic variation. Concerns over the genetic diversity of the spotted owl have been raised for these reasons.

The genetic diversity of plant communities is also a major concern in northwestern Oregon. The planting of genetically-selected stock has been challenged by some who believe this stock may be less adaptive to changing environmental conditions. Others maintain that genetic diversity of forest plantations established in recent years is highly variable. The latter believe genetic diversity of plantations is dependent on:

- the number of seed trees used as sources;
- the number of natural seedlings established within plantations; and
- the compatibility of seedlings with the planting site.

The selection and storage of seeds from specific seed zones and elevations is intended to maintain local genetic diversity and assure site adaptability of seedlings (see appendix L for further discussion). About 1,026 acres of BLM-administered land in the district have been planted with genetically-selected trees during the past decade.

Species Diversity

Forest organisms include plants, birds, mammals, reptiles, insects, and less visible organisms such as soil mycorrhizal fungi. Maintaining species diversity requires maintaining viable populations of each species. When local populations of a species drop below this viable populations level, local extinction of the species becomes more probable (Schafer 1990).

The plant species composition of unmanaged, natural forests was shaped by the interaction of evolutionary processes, changes in climate which occurred over time, and ecological processes such as disturbance and succession (Polunin 1960). With the exception of fires periodically set by American Indians to create desirable plant and animal habitat, natural factors predominantly shaped the forest ecosystem in western Oregon prior to about 1840. Of these factors, disturbances were most significant. Wildfire, windthrow, insect attack, and tree disease resulted in the replacement of older seral stages with younger stages which precluded the development of climax stages in some areas. Historically, wildfire has been the dominant disturbance. The prehistoric cycle of stand-replacing fires (which cause high or com-

plete mortality in an overstory stand of trees) probably occurred at irregular intervals (Teensma et al. 1991).

Species diversity of managed forests varies depending on time since harvest, tree species planted, potential natural vegetation, and the management regime which was applied. Large scale logging on BLM-administered lands began between 1910 and 1920. Today, approximately 50 percent of the forest land administered by the BLM consists of even-aged stands less than 60 years old which regenerated or were planted following clearcutting. The balance of the forest lands are considered natural stands.

Plant species diversity varies by plant community, associated site conditions, and successional stage. The number and acres of major forest plant groupings are shown in table 3-11. The distribution of these groupings is shown on map 3-4. Young seral stages are dominated by sun-tolerant, pioneer plant species such as grasses and annual forbs. Older seral stages support shade-tolerant plants including an abundant growth of mosses and lichens. Old-growth stands contain the most nonliving organic material and associated organisms. Plant diversity is highest in younger seral stages and older forests, and lowest in mid-seral stages (Schoonmaker and

McKee 1988). The Extensive Forest Inventory of the district completed in 1988 supports this finding. In the Coast Range, hardwoods and western hemlock provide for greater diversity in the early seral stages. In the Cascade Range, noble fir and silver fir are found in early seral stages at elevations above 3,000 feet. In the Coast and Cascade ranges, western hemlock becomes a greater component in the older forests. In the mid-seral stages, Douglas-fir predominates and species diversity decreases. Current forest species composition in mature and old-growth stands on BLM-administered lands in the planning area is shown in table 3-12.

Animal species diversity is directly related to habitat diversity (Brown 1985). It varies geographically and seasonally. Animal diversity in western Oregon is highest in younger seral stages and older forests and lowest in mid-seral stages (Harris 1984). During the spring through fall seasons, diversity increases due to seasonal migration. The introduction of exotic plants, diseases, and insects has significantly changed species diversity in the planning area. For example, Scotch broom, an introduced species, has dominated native plant habitat in some locations. Another example is the introduction of the bullfrog which has apparently eliminated the spotted frog in western Oregon (Applegarth 1991).

Table 3-11 Acres of Major Plant Groupings and Seral Stages

Plant Grouping ¹	Seral Stage					Total
	Early (0-10 years old)	Mid (20-30 years old)	Late (40-80 years old)	Mature (90-199 years old)	Old Growth (200+ years old)	
S / SA / DF	1,900	2,100	3,500	2,300	0	9,800
D / RA / SM	16,300	19,400	25,300	24,600	3,900	89,500
D / RA / VM	11,300	20,600	41,000	12,100	4,600	89,600
D / OS / H	5,000	12,700	30,800	2,800	900	52,200
D / B / SA	19,100	21,600	29,800	32,400	17,500	120,400
TF / RH / H	4,200	5,900	1,500	7,600	5,400	24,600
Total	57,800	82,300	131,900	81,800	32,300	386,100 ²

¹ S / SA / DF = Sitka Spruce / Salal / Deer Fern
 D / RA / SM = Douglas-Fir / Red Alder / Salmonberry
 D / RA / VM = Douglas-Fir / Red Alder / Vine Maple
 D / OS / H = Douglas-Fir / Ocean Spray / Herbs-Grasses
 D / B / SA = Douglas-Fir / Mixed Brush / Salal
 TF / RH / H = True Fir / Rhododendron-Ceanothus / Beargrass

² Nonforest acres (e.g., grasslands, nonforest rock, surface water, etc.) are not included in this total. Total acreage of Salem District is 398,100 acres.

Source: Western Oregon Digital Data Base.

Table 3-12 Species Composition in Mature and Old-Growth Stands

Master Unit	Species Composition by Basal Area (percent)					
	Douglas-Fir	Western Hemlock	True Fir	Other Conifer	Sitka Spruce	Hardwood
Alesea-Rickreall						
Mature	83	10	0	1	0	5
Old-growth	81	16	0	1	0	2
Clackamas-Molalla						
Mature	81	11	5	2	0	1
Old-growth	48	35	17	0	0	0
Santiam River						
Mature	77	14	2	2	0	5
Old-growth	66	26	5	3	0	0
Columbia River						
Mature	96	4	0	0	0	0
Old-growth	0	0	0	0	0	0

Mature = 90 to 199 years old.

Old-growth = 200 years and older.

Source: Salem District timber inventory records.

Ecosystem Diversity

Ecosystem diversity may be assessed by the variety of seral stages and plant community types including special habitats. It also includes structural and functional components of ecosystems. Ecosystem diversity may be described at a variety of scales, from watersheds to forest stands.

In western Oregon, the most obvious difference between seral stages is stand structure, such as the presence of large trees, snags, canopy gaps, and fallen trees. Structural components may be described in terms of physical size, height, and horizontal/vertical stratification within the stand. Structural components retained from older seral stages (biological legacies) in recently harvested, managed forests help provide for the reestablishment of mature and old-growth species and ecological functions after disturbance. In unmanaged forests, the level of retention varies greatly between stands. Physical structures provide habitat required by species, energy sources, and materials that support functional processes. Structures and their associated species support the processes of forest succession, incorporation of organic matter into soils, and predator-prey relationships.

The old-growth seral stage has high structural diversity because of the presence of multi-layered canopy, abundant large, green trees and snags, downed logs, and canopy gaps. Canopy gaps are important in providing edge habitat and influencing species composition, successional dynamics, and nutrient cycling. Old-growth stands develop multiple canopies as young trees begin to fill in the canopy gaps (Spies et al. 1990). The early seral stage usually has the lowest structural diversity compared to the old-growth stage. This has been due to the removal of most snags, decadent trees, and downed logs during past logging activities. Retention of snags and green trees at time of regeneration harvest helps retain biological legacies and increases structural diversity. The structural diversity of mid and late seral stages is greater than the early seral stage but less than mature and old-growth stands (Franklin and Dyrness 1973, Long 1977, Franklin et al. 1981). Some of the structural characteristics of certain seral stages in the planning area are displayed in table 3-13. The average amount of downed logs per acre is summarized in table 3-14.

Functions are the activities, roles, or processes performed by structures (U.S. Department of Agriculture, Forest Service 1992), such as nutrient cycling, plant and animal reproduction, and nitrogen fixation. Functions are maintained within the range of natural

variability as long as the species, structures, and structural arrangements of ecosystem components are also within the range of natural variability. Of all the functional mechanisms responsible for shaping forest communities, disturbance events are the most important. These events initiate plant succession in patches and entire stands and prevent succession from continuing to a true climax on most sites.

Ecological Health

The Regional Ecosystem Assessment Project, as described in U.S. Department of Agriculture, Forest Service 1993, compared current ecological health of Pacific Northwest forest ecosystems with the estimated conditions of those ecosystems from 1600 to the mid-1900s. The results are based on Forest Service-administered lands, but also apply to BLM-administered lands because of their proximity to Forest Service-administered lands. During the last 100 years, human activity has dramatically changed the natural environment. Forest land has been particularly affected by logging and silvicultural practices. The most striking changes in the planning area have occurred within the last 30 to 50 years and include:

- Widespread increases in forest fragmentation. Fragmentation patterns differ within BLM stands and within the entire managed landscape because of different management approaches on different ownerships.
- A decrease in the acreage of old-growth, mature, and late seral stands, with a corresponding increase in the acreage of early and mid-seral stands. Early and mid-seral stands resulting from logging operations generally have fewer snags and less structure than found in natural stands.

- Aquatic and riparian habitats appear to have changed from the range of natural variability. Most streams in the managed landscapes exhibit signs of degraded habitat conditions including a shortage of deep pools, spawning habitat and large, woody debris.

The current ecological health in the Salem District is considered within the probable range of historic conditions. The above stated changes are temporary conditions which time and natural processes alleviate. Based on district observation, the natural rate of tree mortality is low within the major plant groupings and for all seral stages, unless catastrophic events occur. The causes associated with natural mortality are shown in table 3-15. Most stands continue to be fast growing and vigorous. Although Douglas-fir planting was emphasized in the past, species composition is within the range of historic conditions. Essentially, forest composition has not significantly changed over time. Management activities have increased the hardwood component to a degree, and planting in the last decade has included a more diverse species composition than in the past. The trend in forest condition is estimated to be stable.

Disease and insects are natural components of ecosystems. Four root diseases found in the planning area are: *Phellinus weirii* (laminated root rot), *Armillaria ostoyae* (shoestring root rot), *Heterobasidion annosum* (annosus root rot), and *Leptographium wageneri* (black stain root rot). Few forested areas are without one root disease or another. Surveys indicate that 10 to 15 percent of BLM-administered lands in the Salem District are infected with root disease. Management activities can increase or decrease buildup of inoculum over time.

Table 3-13 Structural Characteristics of Seral Stages

Seral Stage	Average Diameter (Inches)	Average Trees per Acre Over 30 Inches	Percent of Acres Exceeding 70% Canopy Closure	Percent of Acres With One and Two Canopy Layers	
				One	Two
Late (40 to 80 years old)	16.4	15.5	83	87	13
Mature (90 to 200 years old)	24.6	18.9	89	83	17
Old-growth (200 years and older)	26.5	15.5	94	76	24

Source: Salem District timber inventory records.

Table 3-14 Downed Logs in Conifer Stands

Seral Stage	Downed Logs Per Acre (tons)	Number of Plots
Early-Mid	26	214
Late	32	242
Mature	24	119
Old-growth	38	57

Source: Salem District timber inventory records.

Table 3-15 Causes and Rates of Tree Mortality on BLM-administered Lands

Seral Stage	Natural Mortality Rate	Typical Mortality Causes
Early	Low to Moderate	Animal Damage (mountain beaver, gopher) Between-Species Competition (e.g., shrub competition) Drought (minor) Frost (minor) Heat (minor)
Mid	Low	Between-Species Competition Disease
Late	Low	Within-Species Competition Disease
Mature	Low	Disease Insects (minor) Wind
Old-growth	Low	Disease Insects (minor) Wind Old Age

Source: Salem District resource specialist.

Generally, insects take advantage of stressed trees, such as diseased trees. Insects act as a carrier for black stain root rot. Historically, insects have not been a significant problem. A major stress event, such as blowdown, could create insect problems.

Phaeocryptopus gaumanni (Swiss needle cast) is a problem in some coastal areas of the Tillamook and Yamhill resource areas. These areas were unintentionally planted with seed from inland seed sources. From 1950 through 1970 seed zones were larger than present zones. Also, seed from outside, but planted within the fog belt lead to disease and poor health conditions. Localized areas within the Sitka spruce zone may be outside the range of historic conditions due to Douglas-fir planting. The Sitka spruce weevil attacks and kills or seriously injures the Sitka spruce terminal shoots from about 8 to 30 years old and up to 50 feet tall. Crooked or bushy, low-value trees are the result (Furniss and Carolin 1977).

The Timber Production Capability Classification system identified 38,000 acres with more than 12 percent compacted soils caused by past management practices. Compaction is an intermittent process in natural ecosystems through natural events, such as windthrow, which cause limited and localized compaction. The natural processes of freeze and thaw, aeration by soil micro and macro organisms, and root growth keep the soil loose. Overall, compaction has not resulted in forest health decline, though in localized areas with multiple entries there have been effects on tree growth and survival.

Landscape Diversity

Landscape diversity may be described in terms of the arrangement of plant communities within a province or watershed, or in terms of the arrangements of patches within a forest stand. A landscape interspersed with grasslands, shrublands, meadows, ponds, streams, wetlands, and forests has greater biological diversity than one with a broad expanse of grassland. Forests with patches of uneven-aged trees have more diversity than a uniform even-aged forest. Recent settlement activities which have affected landscape diversity include logging, fire suppression, urbanization, cultivation, grazing, and recreation.

Much of the concern over landscape management focuses on the amount and location of remaining late-successional forest patches. Teensma et al. (1991) estimated that older forests occupied 65 percent of the forest land in western Oregon in the

1850s due primarily to wildfires. In the Tillamook area during the first half of the 19th century, wildfires burned areas as large as 100,000 acres. Such fires created a greater emphasis on fire suppression. This has progressively reduced the size and frequency of wildfires (Teensma et al. 1991). Reduced wildfire has created denser underbrush and increased proportions of shade-tolerant climax species (Stewart 1986). It has also caused the encroachment of trees into natural openings (Vale 1981). In the last ten years, stand-replacing wildfires have burned about 1,400 acres of BLM-administered lands in the planning area. The location of existing mature and old-growth stands is shown on map 3-4.

Along with fire and other human activities, timber harvesting has reduced the amount of forest in older seral stages. It has also fragmented the remaining older stands into a series of habitat islands separated by younger forests. Clearcuts on BLM-administered lands tend to be spread across the landscape and average about 25 acres to partially address big-game concerns. The remaining natural forest is scattered throughout the planning area because of the check-board pattern of BLM-administered lands.

The size of old-growth patches and the seral stages of adjacent stands affect the quality of habitat which exists within old-growth patches. Small patches of old-growth close to the edge of an early seral block are subject to a variety of external influences such as wind causing windthrow and possible increased predation of northern spotted owl. These influences reduce their effectiveness as old-growth habitat. Thus, effective interior old-growth habitat is substantially less than total old-growth habitat (Harris 1984). Most studies identifying the extent of such influences have occurred outside the Pacific Northwest. Harris concluded that edge effects extend 600 feet into old-

growth stands from adjacent clearcuts. This is due to changes in environmental parameters such as light, temperature, and relative humidity. Harris also stated that old-growth stands must exceed 1,200 feet across and 26 acres in size before interior old-growth habitat begins to be retained with all old-growth characteristics intact. Chen et al. (1990) indicated that the effect of edge on relative humidity extends over 787 feet into old-growth stands. Other analysts have concluded that effective habitat starts about 400 feet from adjacent clearcuts. The Wilderness Society and the Forest Service have used the latter distance in some recent analyses.

The extent of fragmentation of older forest habitat on BLM-administered lands is shown in table 3-16. About 73 percent of interior old-growth blocks and 64 percent of interior old-growth and mature blocks are less than 80 acres. Interior habitat shown in that table is at least 400 feet from adjacent lands with forest stands younger than 70 years or in private ownership. Seventy-one percent of old-growth habitat blocks are less than 80 acres. Many of the largest blocks of old growth contain little interior habitat due to clearcut harvesting.

Harris (1984) suggests that habitat fragmentation has substantially reduced the population of forest interior animal species such as fishers, wolverines and lynx, compared to that existing prehistorically. However, Lehmkühl et al. (1991) found that correlations between fragmentation indices and the richness and abundance of animal species in Pacific Northwest forests were weak, i.e., vertebrate richness and abundance showed little relation to landscape variables. The latter authors concluded that fragmentation probably has not reached the critical threshold that would initiate a decline in biotic diversity.

Table 3-16 Existing Older Forest Blocks

Block Size (acres)	<u>Interior Old-Growth</u> <u>(Age Greater than 200 Years Old)</u>		<u>Old-Growth and</u> <u>Mature Combined</u>		<u>Old-Growth</u> <u>Habitat</u>	
	No. of Blocks	Total Acres	No. of Blocks	Total Acres	No. of Blocks	Total Acres
20 to 79	61	2,400	445	17,800	237	9,700
80 to 299	19	2,100	192	27,100	85	12,400
300 to 599	4	1,700	31	12,700	8	2,900
More than 600	0	0	22	32,700	3	4,500

Source: Western Oregon Digital Data Base.

Vegetation

Including Special Forest Products

For the purpose of this proposed resource management plan, vegetation zones are adapted from those identified by Franklin and Dyrness (1973). The three forest vegetative zones found in the planning area are the Sitka spruce zone, the western hemlock zone, and the silver fir zone. Zonal names refer to the single potential dominant climax species.

The Sitka spruce zone is usually found within a few miles of the coast, but may extend inland in some valleys and drainage areas. This zone is also called the fog belt. The zone generally occurs below 450 feet elevation, but it ranges to 1,800 feet on mountain ranges near the coast. Only a small percentage of BLM-administered lands is in this zone. The western hemlock zone extends inland from the eastern edge of the Sitka spruce zone to the eastern edge of the planning area. It comprises the majority of planning area forest lands. The smaller silver fir zone occurs primarily along the eastern edge of the planning area at higher elevations.

For BLM-administered lands, upland plant associations within these zones have been classified into six major plant groupings. These groupings, along with their associated seral stages, provide the basis for descriptions of forest communities and wildlife habitat used in the planning process.

There are five seral stages in each major upland plant grouping - early, mid, late, mature, and old-growth. The rate of the successional development from early seral to mature stages varies between major plant groupings (see figure 3-1). It is largely dependent on site factors. However, for analytical purposes, seral stages are considered to have a common duration.

Dominant seral vegetation anticipated for each major plant grouping is shown in table 3-17. Acres of major plant groupings and seral stages are shown in table 3-11. The major plant groupings and location of the mature and old-growth seral stages are displayed on map 3-4.

Smaller vegetative communities occur within the major upland plant groupings described above. These communities include wetland or riparian areas (see Riparian Zones discussion), grassy balds and meadows, and rock cliffs or talus slopes. Minor

communities associated with coastal headlands, tidelands, and ocean front sand dunes also occur on BLM-administered lands in the planning area. Individual plant species of these communities are adapted to the unique environmental or physical conditions present in those locations.

Fire and human activity have played a major role in plant succession. This role is described in the Biological Diversity and Ecological Health section.

The following major upland plant groupings are found on BLM-administered lands in the planning area:

Sitka Spruce/Salal/Deer Fern (S/SA/DF)

Sitka spruce is the predominant species in this zone. Other tree species include Douglas-fir, western hemlock, and western redcedar. Mature forest stands have dense understories of shrubs, herbs, ferns, mosses, and lichens. Mosses and lichens are abundant. Early successional stages following logging and burning tend to be dominated by salmonberry, elderberry, and huckleberry. Red alder often invades disturbed forest land, forming nearly pure stands. Much of the natural conifer regeneration takes place on rotting logs or nurse logs, which provide a favorable rooting area, especially for western hemlock.

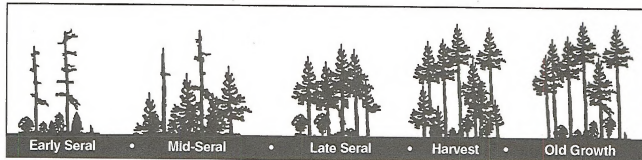
Douglas-Fir/Red Alder/Salmonberry (D/RA/SM)

This grouping occurs on very moist Coast Range sites west of the Douglas-fir/red alder/vine maple grouping and east of the Sitka spruce zone. Douglas-fir, western hemlock, and western redcedar are the main overstory species; Sitka spruce occurs sporadically near the coast. Red alder and bigleaf maple are the primary hardwoods. Red alder may dominate sites for long periods following disturbances. Shrubs consist of salmonberry, red huckleberry, salal, and vine maple. Swordfern is the primary understory herbaceous species. Removal of the conifer overstory generally results in rapid site domination by red alder and salmonberry.

Douglas-Fir/Red Alder/Vine Maple (D/RA/VM)

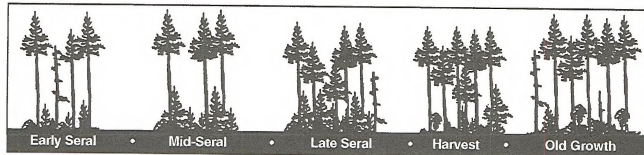
This grouping occurs on moist sites of the east slope of the Coast Range. Major conifer tree species include Douglas-fir, western hemlock, and western redcedar. Predominant shrubs are red huckleberry, salal, vine maple, and blackberry. Red alder and bigleaf maple are present in varying amounts. Red

Natural, Catastrophic Stand Replacement



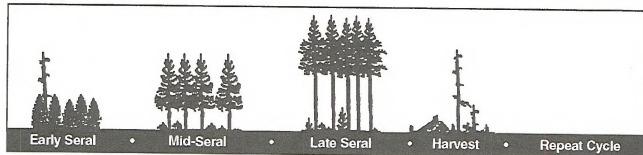
The first seral stage consists of dead trees, down trees, forbs, brush, and conifer seedlings (and very few living trees which serve as a seed source). Succession progresses in a more or less even-aged sequence, with vertical and fine-grained diversity developing in the mature seral stage and being fully expressed in the old-growth stage.

Natural, Partial Stand Replacement



This succession path is very common in southwestern Oregon. The first seral stage consists of a patchwork of surviving green overstory trees, dead trees, and down trees. Patches contain young conifers, forbs, and hardwoods. Development is uneven-aged and patchy with vegetation developing in the understory and in patch openings, while overstory trees slowly die, turn into snags, and fall.

Even-age Managed Forest



This successional path begins after nearly complete removal of conifer volume in logging, leaving a few snags and a small amount of down wood. Development is even-aged and is truncated by harvest in short rotations.

Figure 3-1 Seral Stages

Table 3-17 Dominant Seral Vegetation by Seral Stage and Major Plant Grouping

Plant Grouping	Seral Stage				
	Early Seral (0-10 years old)	Mid Seral (20-30 years old)	Late Seral (40-80 years old)	Mature (90-200 years old)	Old-Growth (200+ years old)
S / SA / DF	He-Sh	C-Sh	C	C	C
D / RA / SM	He-Sh	C-Hd	C-Hd	C	C
D / RA / VM	He-Sh	C-Hd	C-Hd	C-Hd	C-Hd
D / OS / H	He-Sh	C-Sh	C	C	C
D / B / SA	He-Sh	C-Sh	C	C	C
TF / RH / H	He-Sh	C-Sh	C	C	C

S / SA / DF = Sitka Spruce / Salal / Deer Fern
 D / RA / SM = Douglas-Fir / Red Alder / Salmonberry
 D / RA / VM = Douglas-Fir / Red Alder / Vine Maple
 D / OS / H = Douglas-Fir / Ocean Spray / Herbs-Grasses
 D / B / SA = Douglas-Fir / Mixed Brush / Salal
 TF / RH / H = True Fir / Rhododendron-Ceanothus / Beargrass

He = Herb
 Sh = Shrub
 Hd = Hardwood
 C = Conifer

Source: Western Oregon Digital Data Base.

alder grows on exposed mineral soil. The herb layer, when present, is dominated by swordfern and oxalis. Plant communities vary depending on the impact and presence of marine airflows across the Coast Range. Drier sites have more ocean spray, chinquapin, and herbaceous species than wetter sites.

Douglas-Fir/Ocean Spray/Herbs and Grasses (D/OS/H)

This grouping is found adjacent to the Willamette Valley floor on warm, dry sites at elevations less than 1,500 feet. Other tree species are grand fir, bigleaf maple, and madrone. Shrubs are hazel, chinquapin, ocean spray, vine maple, Oregon grape, and poison oak. Most of these sites have experienced frequent fires. Soils often contain large amounts of clay.

Douglas-Fir/Mixed Brush/Salal (D/B/SA)

This grouping occurs on the west slope of the Cascade Range below 2,500 feet elevation. Stands are mainly Douglas-fir. Western hemlock, bigleaf maple, and western redcedar are associated spe-

cies. Shrubs include salal, vine maple, Oregon grape, and hazel. Dominant herbs are swordfern and bracken fern.

True Fir/Rhododendron-Ceanothus/Beargrass (TF/RH/H)

This grouping is found in dry, cool environments from 3,000 to 5,500 feet elevation. Stands typically consist of Douglas-fir, noble fir, western hemlock, silver fir, mountain hemlock, and western white pine. In older stands, an understory of silver fir and western hemlock develops beneath the canopy. The shrub layer consists of rhododendron, dwarf Oregon grape, Alaska huckleberry, and big huckleberry. The herbaceous layer includes beargrass, twinflower, dogwood huckleberry, and rattlesnake plantain. Productivity is relatively low. Fire can increase the amount of ceanothus, beargrass, and sedge species.

Pacific Yew

The Pacific yew is of special interest because of its value and concern for its long-term survival and management. It extends from southeastern Alaska along the Pacific Coast to northern California and eastward to the Rocky Mountains. It is usually found on moist sites in stream bottoms, on upland flats,

benches, and gentle slopes. Normally Pacific yew occurs as an understory tree in older forest types, although it can survive logging disturbance and become part of younger, even-aged stands. The species resprouts after moderate disturbance but can be killed by intense fire. Its seeds are mostly spread by birds and tends to reproduce where birds roost or in decaying forest litter or wood. It is not usually found as a seedling in young forest stands. The Pacific yew is the most tolerant of coniferous trees and grows slowly. Maturity is attained in 250 to 300 years.

The bark of the Pacific yew is a source of taxol which has shown considerable promise in treating certain kinds of cancer. To assure a sustainable source of supply, harvest restrictions have been imposed.

Special Forest Products

Special forest products are located throughout the district. Numerous plant species are harvested for personal and commercial use. A partial listing of existing or potential special forest products and their uses are found in table 3-18. Although qualitative information exists for most special forest products, quantitative information for many of them is not available. Inventories of special forest products are incomplete. The forest stand exam inventory data currently being collected in the district contains elements which document occurrence of some special forest products.

Documentation of these products occurs when they are harvested under permit. Those sold for harvesting under permit between fiscal years 1989 and 1993 in the Salem District are shown in table 3-19.

Table 3-18 Partial List of Special Forest Products on BLM-Administered Lands

Product	Existing Possible Uses ¹				
	CR	CO	FO	LP	PH
American ginger (<i>Asarum caudatum</i>)			X	X	
Beargrass (<i>Xerophyllum tenax</i>)	X				X
Berries (<i>Rubus</i> sp.)			X		X
Black twinberry (<i>Lonicera involucrata</i>)	X				
Cascara sagrada (<i>Rhamnus purshiana</i>)					X
Cedar (<i>Cupressaceae</i>)	X			X	
Common cattail (<i>Typha latifolia</i>) ²	X		X		X
Current/gooseberry (<i>Ribes</i> sp.)			X	X	X
Devil's club (<i>Oplopanax horridum</i>) ²	X			X	X
Elderberry (<i>Sambucus</i> sp.)			X		X
False-hellebore (<i>Veratrum</i> sp.) ²					X
Ferns (<i>Polypodiaceae</i>)	X			X	
Foxglove (<i>Digitalis purpurea</i>) ³					X
Fungi	X		X		X
Golden chinquapin (<i>Castinopsis chrysophylla</i>)	X			X	
Goldenrod (<i>Solidago</i> sp.)			X	X	X
Huckleberries (<i>Vaccinium</i> sp.)	X		X	X	
Lichens	X				X
Manzanita (<i>Arctostaphylos</i> sp.)	X			X	
Maples (<i>Acer</i> sp.)	X			X	
Ocean spray (<i>Holodiscus discolor</i>)	X				
Oregon boxwood (<i>Pachistima myrsinites</i>)	X			X	
Oregon grape (<i>Berberis</i> sp.)	X		X	X	X
Oregon white oak (<i>Quercus garryana</i>)	X			X	
Pacific dogwood (<i>Comus nuttallii</i>)	X		X	X	
Pacific ninebark (<i>Physocarpus capitatus</i>) ²	X				
Pine/fir/spruce (<i>Pinaceae</i>)	X	X	X	X	X
Poison oak (<i>Rhus diversiloba</i>)					X
Prince's pine (<i>Chimaphila</i> sp.)	X		X	X	X
Red alder (<i>Alnus rubra</i>)	X	X	X	X	
Skunk cabbage (<i>Lysichitum americanum</i>) ²					X
Spreading phlox (<i>Phlox diffusa</i>)				X	
St. John's wort (<i>Hypericum</i> sp.)					X
Western Solomon's plume (<i>Smilacina racemosa</i>)	X				
Wild cucumber (<i>Marah oreganus</i>)					X
Willows (<i>Salix</i> sp.) ²	X		X	X	X
Wintergreen/salal (<i>Gaultheria</i> sp.)	X			X	X
Woodland beardtongue (<i>Nothochelone nemorosa</i>)				X	
Wood-sorrel (<i>Oxalis</i> sp.)			X	X	
Yarrow (<i>Achillea millefolium</i>)	X		X	X	X
Yellow monkeyflower (<i>Mimulus guttatus</i>)				X	
Yellow-rose cinquefoil (<i>Potentilla fruticosa</i>)				X	

¹ CR = Crafts/Florals CO = Cones FO = Food resource LP = Live plants PH = Pharmaceutical² Riparian species.³ In some forms may be poisonous to humans.

Source: Salem District botanists.

**Table 3-19 Special Forest Products Sold Under Contract
on the Salem District During Fiscal Years 1989-1993**

Product	Number of Permits Issued	Amount Sold	Amount Sold Fiscal Years '89-'93 Value (dollars)
Pulpwood	11	384.88 MBF	2,176.07
Marginal logs	28	326.58 MBF	4,074.25
Cedar bolts and shakes	44	77.35 MBF	6,907.00
Corral poles	6	200.94 MBF	265.40
Small poles	8	1,064.52 MBF	275.50
Split rails	1	6.36 MBF	202.00
Line posts	17	25.70 MBF	1,021.75
Corner posts	4	1.60 MBF	90.00
Fence stays	1	0.10 MBF	10.00
Subtotal	120	2,088.02	\$ 15,021.97
Fuelwood	1,922	7,223 cords	34,865.50
Subtotal	1,922	7,223	\$ 34,865.50
Cones	10	1,300 bushels	775.00
Subtotal	10	1,300	\$ 775.00
Christmas trees	11	1,142 each	1,426.50
Wildlings ²	28	14,564 each	909.00
Subtotal	39	15,706	\$ 2,335.50
Cascara bark	36	14,860 pounds	678.00
Moss	212	392,597 pounds	3,382.29
Boughs	73	323,779 pounds	36,682.35
Herbs	2	120 pounds	10.70
Mushrooms	1	50 pounds	35.00
Burls	2	600 pounds	30.00
Subtotal	326	732,006	\$ 40,818.34
Huckleberry	30	16,890 bunches	847.00
Ferns	29	7,220 bunches	505.00
Beargrass	3	1,350 bunches	257.00
Greens ³	9	6,629 bunches	130.00
Subtotal	71	32,089	\$ 1,739.00
Total Number of Permits Issued	2,488		
Total Value (dollars)			\$ 95,555.31

¹ MBF = thousand board feet.

² Wildlings are considered to be those plants that are sold as transplants.

³ Greens include many special forest products species that are used in crafts and floral designs.

Since Pacific yew is currently being managed as a separate program, it is not considered a special forest product.

Source: BLM Timber Sale Information System.

Riparian Zones

Riparian zones occur adjacent to waterways, from the smallest ponds, wetlands, and streams to the largest lakes and rivers. The size and extent of riparian zones depend largely on watershed characteristics such as topography, soils, rainfall, water quality and quantity, stream conditions, and width of flood plains. On BLM-administered lands in the planning area, riparian habitat is found along approximately 1,700 miles of first order streams, and 1,596 miles of second through eighth order streams. Riparian zones comprise about eight percent of the land base or 30,260 acres. Riparian vegetation around small, perennial second and third order streams uses up 65 percent of the total stream riparian acres.

Under natural conditions, conifers (western redcedar, western hemlock, and Douglas-fir) dominate riparian overstories in small V-shaped drainages. Deciduous trees (red alder, bigleaf maple, black cottonwood, and Oregon ash) are more prevalent along higher order streams. Deciduous trees, herbs, and shrubs are generally more abundant in riparian areas than in upland communities (see chapter 2).

According to Campbell and Franklin (1979) and Franklin et al. (1981), the greatest structural diversity in riparian areas is provided by old-growth forest. A method of evaluating the condition of riparian zones was developed based on this conclusion and the knowledge of BLM biologists. The method uses average tree size, which can be derived from the operations inventory data base, as the indicator of riparian habitat condition. In some riparian areas, operations inventory data has not been collected. An estimate of average tree size for these areas was made using inventory data from adjacent forest stands.

In western Oregon, riparian habitat with mature trees averaging greater than 21 inches diameter at breast height provides the greatest plant and structural diversity, a high level of animal diversity, and a high level of woody debris (Brown 1985). Mature riparian zones also contribute a high level of aquatic diversity and provide primary habitat for several wildlife species (see Wildlife Habitat section). Standing riparian vegetation helps regulate water temperature through shading. It also provides nesting, roosting, cover habitat, and food sources for a variety of terrestrial and aquatic animals (Brown 1985). Mature riparian vegetation maintains water quality, lessens

Table 3-20 Existing Conditions of Riparian Zones on BLM-Administered Lands

Stream Order	Acres of Each Condition Class ¹ by Stream Order				Total ²
	1 (minimal)	2 (minimal)	3 (fair)	4 (good+)	
Second	2,950	2,270	3,180	2,650	11,050
Third	1,560	1,840	2,140	2,110	7,650
Fourth	900	1,040	1,480	1,460	4,880
Fifth	370	630	880	930	2,810
Sixth	140	440	800	870	2,250
Seventh	10	30	20	30	90
Eighth	0	10	10	50	70
Total ²	5,930	6,260	8,510	8,100	28,800

¹ Riparian condition class equates to size of trees (diameter breast height) in riparian zones:

- Class 1 (minimal condition) = 0 to 5 inch trees
- Class 2 (minimal condition) = 5 to 11 inch trees
- Class 3 (fair condition) = 11 to 21 inch trees
- Class 4 (good/optimal condition) = larger than 21 inch trees

² Does not include additional acres resulting from Molalla River exchange lands because analysis of condition class was incomplete at the time of publication.

Sources: Western Oregon Digital Data Base and Salem District timber inventory records.

peak flood flows, and reduces erosion. Downed mature trees within flood plains provide terrestrial animal cover and food, dissipate water energy, trap sediment, increase water storage, change flow patterns, and maintain and improve aquatic habitat conditions.

Table 3-20 displays the existing conditions of riparian zones and the tree sizes upon which the conditions are based. Generally, riparian conditions have been degraded by road construction and forest management practices. About 44 percent of the riparian zones are in minimal condition, with the average tree size less than 11 inches diameter at breast height. About 27 percent of the riparian zone acres are in good to optimal condition. Generally, riparian habitat in smaller streams has a higher percentage of acres in minimal condition. Larger streams have a higher percentage of acres in good to optimal condition.

Wildlife Habitat

Some 351 vertebrate wildlife species occur within the planning area. This total includes approximately 74 mammals, 239 birds, 19 reptiles, and 19 amphibians. Most of these species live in interior forest areas: a few inhabit the coastal area including coastal headlands, tidelands, and ocean front sand dunes. Many of the 351 species have not been inventoried on BLM-administered lands. Other than some special status species and big game species, wildlife numbers and distributions are poorly documented.

This proposed resource management plan/final environmental impact statement focuses on priority wildlife species including special status and several other important species. Special status species, which include federal threatened and endangered, federal proposed, federal candidate, state threatened and endangered, BLM sensitive, and BLM assessment species, are discussed in the Special Status and SEIS Special Attention Species and Habitat section. This section covers other priority species including important game species and other species considered vulnerable to impacts from forest management. A list of these species is provided in table 3-21 along with information on habitat affinities and population levels.

Each of these priority species or groups of species requires a specific set of habitat conditions. These conditions may be found within the plant communities and seral stages which occur in the planning area.

As explained in the Vegetation section, each major plant community has the potential to produce seral stages ranging from early seral to old growth. Seral stage diversity is generally correlated with wildlife diversity (Brown 1985). That is, the greater the number of different seral stages and associated edges present within an area, the greater the number of wildlife species present. Seral stages normally progress toward their climax stage although the rate of succession may vary dependent on site factors. Natural events or human activities, such as fire and logging, have set succession back to earlier seral stages within most of the planning area. As a result, wildlife species preferring younger seral stages are generally favored over those species adapted to older stages. For example, clearcutting old-growth and mature coniferous forests eliminates preferred habitat for the Vaux's swift and varied thrush (Carey et al. 1991) while creating habitat for the creeping vole and Beechey's ground squirrel. Priority species which use these seral stages as primary habitat are shown in table 3-21.

The reduction of mature and old-growth forest stages represents a serious problem for wildlife (Brown 1985). Old-growth and mature forest represent about 26 percent of the BLM-administered land base within the planning area. Under the current BLM timber management plan, some old growth located in older forest retention areas, research natural areas, riparian areas, and fragile sites is not available for planned harvest. Old-growth habitat available for harvest under the current plan has been harvested at 150 acres per year over the past decade. Short rotation lengths in the current plan would preclude development of older forest habitat on intensively managed lands in the future. On private lands adjacent to BLM-administered lands, most older forest has been eliminated. The reduction in older forest habitat has deprived some species of important habitat components. For example, the abundance of cavity-nesting birds has likely declined as a result of reduction of older forest (Nelson 1988). Nesting areas for some neotropical migrants (e.g., olive-sided flycatcher), great blue herons, pileated woodpeckers, and other cavity-nesting birds (Carey et al. 1991), and red tree voles (Corn and Bury 1991), and foraging areas for mountain lion (Harcombe 1976) have likely declined. The habitat of some amphibians, such as Olympic and clouded salamanders, may have declined due to the reduction of old growth (Corn and Bury 1991a).

Early, mid, and late seral stage conifer forests comprise the dominant habitat on BLM-administered lands within the planning area. Approximately 230

Table 3-21 Priority Animal Species in the Planning Area¹

Species	Reason For Listing	Primary Habitat ²	Population Level / Trend ³
Accipiter hawks ⁴	HI ⁵	c,f,k	Unknown
Dominant woodpeckers ⁶	HI	a,d,e,f,h,j,k	Low / Decreasing
Golden eagle	HI	a,e	Low / Increasing
Great blue heron	HI	d,f,i	Low / Stable
Neotropical migrants ⁷	HI	a,b,c,d,e,f,h,i,j,k	Unknown / Decreasing
Osprey	HI	f,h,i	Moderate / Stable
Amphibians	HI	a,b,c,d,e,f,g,j,k	Unknown
Black bear	Game	a,b,c,d,e,f	Moderate / Increasing
Black-tailed deer	Game	a,b,c,d	High / Stable
Mountain lion	Game	a,b,d,f,g	Low / Stable
Roosevelt elk	Game	a,b,c,d,e,f	Moderate / Stable
Upland game birds ⁸	Game	a,b,c,d,e,f,h,i,j,k	Moderate / Stable to Declining

¹ Does not include special status species.

² Primary habitat includes breeding, feeding, or resting sites within the following seral stages and special habitats (after Brown 1985):

- a = early seral
- b = mid seral
- c = late seral
- d = mature
- e = old-growth
- f = riparian
- g = talus slope/cliff
- h = snags
- i = coastal
- j = dead and downed
- k = hardwood

³ Determined by district biologists based on field observations and consultation with other agencies. Population levels of many wildlife species are difficult to determine and therefore must be considered estimates only.

⁴ Includes sharp-shinned hawk, and Cooper's hawk. Northern goshawk is considered in Special Status Species section.

⁵ HI = High interest and concern (species considered vulnerable to impacts from forest management). The list is not exhaustive and represents only examples of species considered vulnerable to management impacts. Determined by district biologists.

⁶ Includes pileated woodpecker, hairy woodpecker, downy woodpecker, red-breasted sapsucker, and northern flicker. The habitats used by these species are representative of other cavity users as well.

⁷ Birds that winter regularly south of the Tropic of Cancer (after Sharp 1992).

⁸ Includes ruffed grouse, blue grouse, wild turkey, California quail, mountain quail, band-tailed pigeon, and mourning dove.

Sources: Brown 1985; Sharp 1992.

wildlife species find their primary habitat within these stages. Priority species which use these seral stages as primary habitat are shown in table 3-21. Wildlife problems associated with these habitats are related more to quality (e.g., stand structural characteristics, landscape patterns, extent of road construction) than availability of habitat. For example, the declining cover and extensive road construction have adversely affected big game populations (Brown 1985).

An evaluation has been conducted of habitat effectiveness for elk on BLM-administered lands in 27 watersheds within the planning area. This analysis generally indicates marginal cover and forage quality conditions and road densities exceeding 1.5 miles per square mile. These densities are higher than recommended by the Oregon Department of Fish and Wildlife. Adjacent private lands contribute additional forage but very little optimal thermal cover. Another problem is commercial thinning. As practiced in the past, this thinning tended to reduce dense nesting habitat required by some accipiters (Reynolds 1983) and to eliminate decadent trees used by cavity-dwelling wildlife.

Reduced habitat diversity is associated with application of intensive forest management practices. These practices include short harvest rotation, snag removal, emphasis on planting one tree species, prescribed fire, and thinning. Stands dominated by a single species (such as Douglas-fir) with few canopy gaps, large residual green trees, snags, or downed large logs (see following discussion) typify reduced habitat diversity.

Besides the conifer forest seral stages described previously, additional habitats have been impacted by forest management within the planning area. These habitat components include snags, dead and downed wood, riparian zones, and special habitats such as dry meadows (4,400 acres), cliffs and talus slopes (5,500 acres), and hardwoods (30,599 acres).

Snags are of special concern because they provide primary habitat for 51 species of birds and mammals. Dominant woodpeckers use snags as primary habitat. Cavity-nesting birds, including woodpeckers, feed on insects and play an important role in control of forest insect pests (Brown 1985). Under natural conditions, snags occur throughout the forest when trees die due to natural suppression, fire, insects and disease. However, logging and current safety and fire prevention measures have eliminated many snags in

harvest areas. District biologists estimate current populations of the five dominant woodpeckers within the planning area are at 40 percent of potential.

The Oregon Department of Fish and Wildlife (1990) believes that highly viable populations of woodpeckers can be maintained if their numbers are at 60 percent of their maximum populations. Seven species of cavity users (house wren, Bewick's wren, violet-green swallow, tree swallow, mountain bluebird, western bluebird, and purple martin) prefer early seral stages resulting from timber harvesting. Retention of snags within early seral stages is crucial to these species. Wildlife tree surveys (includes the tallying of snags and live trees greater than 10 inches diameter breast height and 15 feet tall) during the past decade revealed a range of 0.8 to 1.9 wildlife trees per acre retained on recent clearcut and burned areas. Some of these wildlife trees include soft snags, which will soon decompose and be unavailable as future snag habitat, and small diameter (less than 15 inches) hard snags, which are not as useful to cavity users as larger snags (Schreiber 1987).

Recent concerns have been expressed over species requiring large, dead and downed wood on the forest floor (Maser and Trappe 1984, Maser et al. 1988). Approximately 61 species find their primary habitat in dead and downed wood. Intensive forest management practices such as salvage and thinning have reduced the amount of this habitat (Maser and Trappe 1984). Although effects on species requiring this habitat are largely unknown, Noble et al. (1990) recently found that black bears in the central Coast Range of Oregon prefer large downed wood for denning sites. Corn and Bury (1991a) found that clouded salamanders and ensatinas were the most common salamanders associated with downed wood. They predicted the clouded salamander to be rare in intensively managed forests due to reductions in downed wood.

Riparian zones are also of special concern (see Riparian Zones section). Approximately 172 species of wildlife find their primary habitat in these zones. Priority species which use riparian zones as primary habitat are shown in table 3-21. Timber harvesting on BLM-administered lands has changed riparian habitat on many first and second order headwater streams throughout the planning area. Amphibians such as the Olympic salamander and tailed frog depend on cool, clear water found in these streams. Gilbert and Allwine (1991) concluded that amphibians in the Oregon Cascades can be retained as viable populations wherever crown closure has occurred and breeding streams remain cool and unsilted. The

authors recommended protection of riparian zones among other measures to achieve these conditions. Ospreys and great blue herons, which often nest in riparian areas, especially along higher order streams, may also be affected by modification of riparian vegetation. Modification may include the retention of buffers which are too narrow to provide adequate habitat and, in some cases, the removal of potential nest and roost trees within riparian areas.

Special habitats such as cliffs, talus, wet meadows, and dry meadows, provide elements of forest diversity important to many wildlife species. Priority species which use these areas as primary habitat are shown in table 3-21. For example, black bears and Roosevelt elk use wet meadows as forage and resting areas (Salem District wildlife inventory files), amphibians use wetlands for breeding areas, and mountain lions use cliffs and other rocky areas as hunting, denning, and resting areas (Harcombe 1976). Practices such as timber harvest, road construction, quarry development, and off-highway vehicle use have impacted some special habitats making them less valuable as habitat.

Hardwoods provide primary habitat for about 126 species of wildlife in the planning area. Because of their lower economic value in comparison to conifers, hardwood stands have been converted to conifer stands in the past. Hardwoods in plantations have been cut to allow conifers to grow with less competition (2,500 acres, 1984-1990). In contrast, hardwoods have increased in disturbed and wet sites. The practices of conversion and conifer release have contributed toward the dominance of monotypic, densely-stacked, even-aged stands of second-growth conifers in many portions of the planning area. Pacific slope flycatchers, black-headed grosbeaks, screech owls, and other hardwood-oriented species may be affected by the conversion of hardwoods.

Fish Habitat

Streams, rivers, and other water bodies on BLM-administered lands contain substantial habitat for numerous fish species, especially salmon and trout. These aquatic habitats meet at least one of the life history requirements (spawning, rearing, passage, etc.) for more than 50 species of native and introduced nonsalmonid fishes and ten species of salmon and trout. The descriptions and analyses in this proposed resource management plan are focused on priority fish species which are listed in table 3-22.

Of the 1,596 miles of perennial stream, 340 miles of streams contain cutthroat and rainbow trout and 229 miles support anadromous salmon and trout. Twenty miles of stream above natural or human-made barriers have suitable habitat for anadromous salmonids. Fish are also found in 14 named lakes, 84 small unnamed lakes, and four reservoirs.

Habitat conditions and trends and wild fish population conditions and trends are shown in table 3-22. Wild fish populations refer to naturally spawning fish. Of the stream miles inhabited by coho salmon, steelhead, and cutthroat trout, approximately 40, 41, and 34 percent, respectively, are in minimal condition; and 33, 29, and 26 percent are in good to optimal condition, respectively. For chinook salmon, which are found in larger streams, 26 percent of the stream miles are in minimal condition, and 48 percent are in good to optimal condition. Generally, larger streams are in better condition than smaller streams.

The potential of a stream to support fish production is directly related to the quantity and quality of aquatic habitat. This is closely associated with the condition of the riparian area. Historic changes in riparian areas, including the removal of conifers in riparian and upslope areas, reduced the potential productivity of most streams. Fewer large trees resulted in less instream woody structure, water storage, channel complexity and stability, and suitable water temperatures. Improved riparian and stream channel protection on BLM-administered lands over the last ten years has allowed many stream segments to begin recovering. Full recovery is not expected for 200 years. The productive capability of fish habitat will improve as riparian and stream channels continue to improve.

Table 3-22 Salmon and Trout Conditions and Populations¹

Priority Species	Stream Miles ²	Condition of Habitat (miles)				Current Level ⁴	Wild Population Trend ³
		Minimal	Fair	Good/Optimal	Trend ³		
Chinook	62	16	16	30	+	M	0
Coho	144	57	40	47	+	L	-
Steelhead	188	77	57	54	+	L	-
Cutthroat/rainbow	340	115	135	90	+	L	+
Chum	2	0	2	0	+	L	0

A related factors analysis (i.e., verification of tree size as an indicator of habitat condition) was completed by the Salem District fish biologist.

¹ Habitat and population data are for streams on BLM-administered lands only.

² Does not include additional miles resulting from the Molalla River exchange:

chinook - 16 miles
steelhead - 18 miles
cutthroat/rainbow - 21 miles

³ Impacts: + = increasing/improving; - = decreasing/declining; 0 = stable

⁴ H = high M = medium L = low

Ratings are in relation to ten-year average population levels.

Sources: Stream inventories (150 miles) conducted by the Salem District fish biologist and by Oregon Department of Fish and Wildlife; Western Oregon Digital Data Base.

Special Status and SEIS Special Attention Species and Habitat

The categories of special status plant and animal species are federal threatened and endangered, federal proposed threatened and endangered, federal candidate, state-listed, bureau sensitive, and bureau assessment species.

Plants and Fungi

Special Status

The BLM inventory for special status plants has been done mainly with clearances for timber sales. Since 1980, approximately 90,000 acres of Salem BLM-administered lands have been inventoried for special status plants. The only federally listed plant species on BLM-administered lands is *Sidalcea nelsoniana*. Special status plants on BLM-administered lands are listed in table 3-23. A description and the general location of special status species plants on BLM-administered lands follows.

Sidalcea nelsoniana - (Nelson's checkermallow)

Species description: A member of the mallow family (*Malvaceae*). This clumping, rhizomatous perennial stands 2 to 4 feet tall. It has small, rose-pink flowers borne on a spike. The flowering season is June to July.

Habitat description: Endemic to the Willamette Valley and Coast Range moist meadows.

Known plant locations: Walker Flat, South McGuire, Neverstill.

Current management: Salem BLM manages three populations of *Sidalcea nelsoniana*. One is a natural population and has been proposed for area of critical environmental concern status. The other two sites are experimental transplant populations designated as study areas. This species has been the focus of extensive inventory, monitoring, and research since 1986.

Aster gormanii - (Gorman's aster)

Species description: A member of the sunflower family (*Compositae*). Gorman's aster is a small rhizomatous perennial with 8 to 13 white to pinkish

Table 3-23 Special Status Species - Plants and Fungi (August 1993)

Species	Status Category	
	Federal	State
<i>Sidalcea nelsoniana</i>	T	T
<i>Aster gormanii</i>	C2	C
<i>Corydalis aqua-gelidae</i>	C2	C
<i>Erythronium elegans</i>	C2	C
<i>Cimicifuga elata</i>	C2	C
<i>Dodecatheon austrofrigidum</i>	C2	--
<i>Filipendula occidentalis</i>	C2	C
<i>Oxyporus nobilissimus</i>	S	--
<i>Anemone oregana</i> var. <i>felix</i>	A	--
<i>Lycopodiella inundata</i>	A	--
<i>Huperzia occidentalis</i>	A	--
<i>Fritillaria camschatcensis</i>	A	--

T = Threatened

C2 = Taxa for which information now in the possession of the U.S. Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules.

C = Candidate

S = Bureau Sensitive

A = Bureau Assessment

Source: U.S. Department of the Interior, Fish and Wildlife Service 1993.

petal-like ray flowers per head. The leaves are crowded, simple and attached directly to the stem. The flowering season is August to September.

Habitat description: Dry, rocky, open ridgetops, and cliffs generally facing south to southwest in the mid-elevation Cascade Range.

Known plant locations: There are several populations all in the Baty Butte-Wash Creek Divide Area.

Current management: Salem BLM manages several populations of *Aster gormanii*. Populations of this species have been monitored since their discovery in 1978.

Corydalis aqua-gelidae - (Clackamas corydalis)

Species description: A succulent perennial of the fumitory family (*Fumariaceae*). The plants grow from

1 to 3.5 feet tall and have several leaves simple or branched that are finely divided. The flowering stems bear numerous, irregular, pale pink to rose-lavender blossoms that develop into pods.

Habitat description: This species is very habitat specific. It grows in still, cool waters. The Snow Peak population is the southernmost known population.

Known plant populations: Snow Peak and Kirk's Bluff.

Current management: Salem BLM manages two populations of *Corydalis aqua-gelidae* which were discovered in 1992. Monitoring on this species was initiated in 1992 and the population's habitat was protected with a wide riparian buffer.

Erythronium elegans - (coast range fawn lily)

Species description: A member of the lily family (*Liliaceae*), *E. elegans* grows 8 to 12 inches tall. Its color varies from pink to nearly white and there may be from one to five flowers on a single stem. The leaves are basal, close to the ground and not mottled. The flowering season is April to June.

Habitat description: This species is known from only five populations in the Coast Range. All are at or above 2,500 feet in elevation growing in open meadows to the deep shade of conifers.

Known plant locations: Lost Prairie, Rocky Point, and Saddleback Mountain.

Current management: Salem BLM manages several populations of *Erythronium elegans*, including a population in an area of critical environmental concern; all other populations are in plant reserves. *E. elegans* is currently the focus of intensive research; recent inventories have yielded additional populations.

Cimicifuga elata - (tall bugbane)

Species description: This member of the buttercup family (*Ranunculaceae*) grows to 6 feet tall. The flowers are white and do not have petals. The leaflets are shallowly lobed and finely serrate closely resembling baneberry (*Actaea rubra*). It blooms from August to September.

Habitat description: Cool, moist north-facing slopes at low elevations, usually associated with big leaf maple (*Acer macrophyllum*) and swordfern (*Polystichum munitum*).

Known plant locations: Molalla River corridor, Yamhill River, Willamina area, and Yampo Tract.

Current management: There are many populations of *Cimicifuga elata* managed by the Salem District. In 1992, a two-year cooperative research agreement with the Oregon Department of Agriculture, the Forest Service, and the BLM was initiated to study the species' habitat, population biology, and disturbance ecology. *C. elata* populations are being retained in federal ownership. An area of critical environmental concern is proposed to protect a population of *C. elata*.

Dodecatheon austrofrigidum - (frigid shooting star)

Species description: A member of the primrose family (*Primulaceae*). It is purple flowered resembling *D. pulchellum*. *D. austrofrigidum* differs in having toothed leaf margins and anther filaments which are not fused.

Habitat description: Shallow soils deposited on basaltic bedrock by floodwaters or among mosses and short herbaceous plants which colonize moist rock surfaces.

Known plant locations: Trask River.

Current management: Salem BLM manages only one population of this rare species, which has only recently been described. A monitoring plan was developed in 1991 and is currently being implemented.

Filipendula occidentalis - (queen-of-the-forest)

Species description: A member of the rose family (*Rosaceae*). This species is a rhizomatous perennial herb from 3 to 7 feet tall bearing numerous small white flowers in dense, flat-topped clusters. The terminal leaves are broad and palmate, resembling maple (*Acer*) leaves. The flowering season is June to July.

Habitat description: Cool moist shade along rock riverbanks on the west side of the Coast Range. It grows just above high water line on boulder strewn washes and rocky north-facing cliffs overlooking streams where seeps and crevices provide moisture.

Known plant locations: Trask River and Siletz River.

Current management: The populations of *Filipendula occidentalis* on the Salem District are in relatively inaccessible sites. Populations have been stable as determined by monitoring.

Oxyporus nobilissimus - (giant polypore fungus)

Species description: This conspicuous fungus has perennial conks with a densely woven mat of fibers on their upper surfaces giving them a fuzzy appearance. Initially the fibers are white. Over time the fibers change to green and ultimately brown. The underside of these conks is composed of tiny white tubes.

Habitat description: Old-growth noble fir trees, snags, and stumps in the Cascade Range of southern Washington and northern Oregon.

Known plant locations: Snow Peak.

Current management: One population of *Oxyporus nobilissimus* is managed by Salem BLM. In 1992, the species at this location was evaluated by a research team from the University of Washington and the Forest Service to learn more about the habitat requirements and life history of this species.

Anemone oregana* var. *felix - (bog anemone)

Species description: A rhizomatous low-growing herb of the buttercup family (*Ranunculaceae*). It has solitary terminal white flowers and more than 60 stamens per flower. Leaves closest to the flower are trifoliate with sharply toothed leaflets. The flowering season is March to June.

Habitat description: Found in bog environments in the Coast and Cascade ranges; cool, moist, grassy areas with a high water table.

Known plant locations: Lost Prairie Area of Critical Environmental Concern.

Current management: Salem BLM manages one population of *Anemone oregana* var. *felix*. Taxonomic verification is on-going at two additional sites. The species has been monitored since its discovery in 1978.

Lycopodiella inundata - (marsh clubmoss)

Species description: A member of the clubmoss family (*Lycopodiaceae*). This deciduous herb has small needle-like leaves. The stems creep and fertile branches are erect.

Habitat description: Acid bogs and wet meadows.

Known plant locations: Helen's Lake.

Current management: Salem BLM manages one population of *Lycopodiella inundata* (formerly known as *Lycopodium inundatum*) which was discovered in 1991. This site is protected in a riparian management area.

Huperzia occidentalis - (fir clubmoss)

Species description: A member of the clubmoss family (*Lycopodiaceae*). Stems on this evergreen herb are erect and in clusters usually 4 to 6 inches tall. The leaves are linear and one-quarter inch long.

Habitat description: Rocky ledges to acid bogs.

Known plant locations: Packers Gulch Creek, White Rock Creek, Thomas Creek, North Mountain, Lukens Creek, and Wildcat Creek.

Current management: Salem BLM manages several populations of *Huperzia occidentalis* and/or *Huperzia myosiana* which was formerly known as *Lycopodium selago*. The status for these two plants is yet to be determined. Many of these populations are in a stable to vigorous condition. Original observations and monitoring have shown that other populations are in a feeble or undetermined condition. Monitoring is continuing.

Fritillaria camschatcensis - (kamchatka fritillary)

Species description: This member of the lily family (*Liliaceae*) has dark greenish-brown to brownish purple tepals. The inner surface of the tepals are prominently ridged and flare outward. The leaves are in one to three whorls of one to several leaves on the stem.

Habitat description: Known from only two populations in Oregon where this species reaches the southernmost of its range. In Oregon *F. camschatcensis* is found in mid-elevation cool sphagnum bogs to wet meadow areas.

Known plant locations: Lost Prairie Area of Critical Environmental Concern.

Current management: This is a new species on the Salem District. Monitoring is yet to be established. The plant population is located in a protected area.

SEIS Special Attention Species

Nonvascular Plants (Lichens and Bryophytes) and Fungi

Lichens, bryophytes (mosses, liverworts and hornworts) and fungi are abundant and widespread within the Salem District. Previous surveys have identified some lichen, bryophyte and fungi species. However, until 1994, no specific efforts had been implemented to describe these resources in detail.

In 1994, inventories were initiated to begin documenting bryophyte and lichen abundance and diversity within the Cascade Range in the Salem District (eastside). In addition, lichen and bryophyte studies have been incorporated into density management studies established in the eastside of the Salem District. The objectives of these studies will be to examine whether density management techniques will contribute towards the development of lichen and bryophyte diversity in managed stands similar to that found in old-growth forest ecosystems. Such studies are long term and will take years for reliable information to become available. Systematic inventories for fungi have not been initiated.

For additional information on lichens, bryophytes, and fungi, see appendix F of this proposed resource management plan and the SEIS (p. 3&4-130 to 3&4-148).

Vascular Plants

Three species of SEIS vascular plants are known to occur on BLM-administered lands in the Salem District: *Allotropa virgata*, *Arceuthobium tsugensis*, and *Corydalis aqua-gelidae*. *Corydalis aqua-gelidae* has already been discussed in this section. *Allotropa virgata* and *Arceuthobium tsugense* have not been identified as BLM special status species and thus have not been tracked systematically.

Allotropa virgata is a perennial species and belongs to the Ericaceae family. It occurs from the east slope of the Cascades to near the coast, from British Columbia to California (Hitchcock and Cronquist 1973). The habitat for the species includes closed canopy pole, mature and old-growth seral stages in *Pseudotsuga menziesii* and other coniferous forest

types. Threats to the species include fire suppression, fragmentation of habitat, and reduction in coarse woody debris, all leading to a decline in this species (see SEIS appendix J2). In the Salem District, *Allotropa virgata* has only been found in the Cascade Range. Survey and management of sites will be initiated according to provisions in the SEIS.

Arceuthobium tsugensis parasitizes *Tsuga* and it is widespread in western North America. This species is fairly common in the Salem District with perhaps more sitings in the Cascade Range than in the Coast Range.

Additional information about these species is outlined in appendix F of this proposed resource management plan and appendix J2 of the SEIS.

The density management studies referred to under Nonvascular Plants and Fungi above will also assess the effects of thinning on some rare vascular plants.

Animals

Special Status Species

Special status animals known or suspected to occur in the planning area and their status category are listed in table 3-24. The following descriptions include federally listed, proposed, and candidate species, as well as, bureau sensitive and assessment species. Descriptions are provided only for taxa that occupy habitat that is most vulnerable to resource management activities or habitat changes resulting from such activities. Except as noted, no systematic inventories have been conducted in the Salem District.

Table 3-24 Special Status Species - Animals (August 1993)¹

Species	Status Category		Occurrence ⁴	Remarks
	Federal ²	State ³		
Federally listed, proposed, and candidates				
Birds				
American peregrine falcon	E	E	a	
Brown pelican	E	E	b	Coastal
Fish				
Oregon chub	E	SC	c	Occur in Finley National Wildlife Refuge North Fork Santiam River but not known to be on Salem District lands.
Mammals				
Columbian white-tailed deer	E	E	a	Columbia River bottoms
Birds				
Aleutian Canada goose	T	E	b	Coastal only
Bald eagle	T	T	a	
Marbled murrelet	T	SC	a	Coast Range
Northern spotted owl	T	T	a	
Western snowy plover	T	T	a	Coastal
Invertebrates				
Oregon silverspot butterfly	T	--	a	Coastal meadows; Mt. Hebo
Mammals				
Northern sea lion	T	SC	a	Coastal
Amphibians				
Cascades frog	C2	SV	c	Above 2,600 feet in Cascade Range
Foothill yellow-legged frog	C2	SV	a	Willamette River drainage
Larch Mountain salamander	C2	SV	a	Columbia River Gorge
Northern red-legged frog	C2	SU	c	
Spotted frog	C2	SC	c	Formerly occurred
Birds				
Harlequin duck	C2	SP	a	Rare
Loggerhead shrike	C2	SU	b	Accidental
Mountain quail	C2	--	a	
Northern goshawk	C2	SC	a	Cascade Range
Tricolored blackbird	C2	SP	a	Rare; Willamette Valley
Fish				
Bull trout	C2	SC	c	Formerly occurred
Coastal coho	C2	--	a	
Clackamas river coho	C2	SC	a	
Coastal steelhead	C2	--	a	
Columbia/Willamette steelhead	C2	--	a	
Invertebrates				
Alsea ochrotichian microcaddisfly	3C	--	a	Benton and Clackamas Counties
Beer's false water penny beetle	C2	--	c	
Beller's ground beetle	C2	--	c	Clackamas County

Table 3-24 Special Status Species - Animals (August 1993)¹ (continued)

Species	Status Category		Occurrence ⁴	Remarks
	Federal ²	State ³		
Federally listed, proposed, and candidates (continued)				
Invertebrates (continued)				
Cascades apatanian caddisfly	C2	--	b	Linn County; high elevation
Clatsop philocascan caddisfly	C2	--	b	Clatsop County
Fender's blue butterfly	C2	--	b	Prairie remnants in Willamette Valley; Kincaid's lupine is host plant
Fender's rhyacophilan caddisfly	3C	--	a	Yamhill, Benton, and Lane Counties
Goeden's lepidostoman caddisfly	C2	--	b	Lincoln County
Haddock's rhyacophilan caddisfly	C2	--	a	Marys Peak
Mt Hood farulan caddisfly	C2	--	b	Mt. Hood N.F., above 4,000-foot elev.
Mt. Hood primitive brachycentrid caddisfly	C2	--	b	Linn County; high elevation
Newcomb's littorine snail	C2	--	c	Marine
One-spot rhyacophilan caddisfly	C2	--	b	Mt. Hood, Lane County; high elevation
Oregon giant earthworm	C2	--	b	Willamette Valley
Roth's blind carabid beetle	C2	--	a	Lincoln and Marion Counties
Siskiyou caddisfly	C2	--	b	Willamette N.F.
Siskiyou chloeaalis grasshopper	C2	--	c	Benton County
Tombstone prairie farulan caddisfly	C2	--	b	Linn County
Tombstone prairie oligophlebodes caddisfly	C2	--	b	Lane County
Vertree's ceracleon caddisfly	C2	--	b	Marion and Benton Counties, Willamette N.F.
Mammals				
California wolverine	C2	T	c	Cascade Range
Fisher	C2	SC	c	
Townsend's big-eared bat	C2	SC	a	One site in Clackamas Resource Area
White-footed vole	C2	SU	c	Coast Range
Reptiles				
Western pond turtle	C2	SC	a	Willamette Valley, Columbia River
<u>Bureau sensitive</u>				
Amphibians				
Oregon slender salamander	S	SU	a	Cascade Range
Mammals				
Fringed myotis	S	SV	a	
<u>Bureau assessment</u>				
Amphibians				
Clouded salamander	A	SU	a	
Cope's giant salamander	A	SU	a	Extreme northwest Oregon; Columbia River Gorge area
Tailed frog	A	SV	a	
Birds				
Barrow's goldeneye	A	SP	b	Uncommon migrant
Black swift	A	SP	b	Rare
Bufflehead	A	SP	b	Common migrant

Table 3-24 Special Status Species - Animals (August 1993)¹ (continued)

Species	Status Category		Occurrence ⁴	Remarks
	Federal ²	State ³		
Bureau assessment (continued)				
Birds (continued)				
Common loon	A	--	b	Common migrant
Dusky Canada goose	A	--	b	Willamette Valley, Columbia River; Coastal
Fork-tailed storm petrel	A	SV	b	Coastal
Great gray owl	A	SV	c	Cascade Range
Greater yellowlegs	A	--	b	
Horned grebe	A	SP	b	Common migrant
Lewis' woodpecker	A	SC	a	Uncommon migrant
Northern saw-whet owl	A	--	a	
Pileated woodpecker	A	SC	a	
Purple martin	A	SC	a	Mainly coastal; a few populations in Coast Range
Three-toed woodpecker	A	--	c	Cascade Range
Western bluebird	A	SV	a	
Fish				
Chum salmon	A	SC	a	Coastal; Columbia River
Invertebrates				
Greenish blue butterfly	A	--	b	Lane County, coastal meadows
Hoary elfin butterfly	A	--	b	Coastal beaches; host plant is Kinnikinnick
Potentilla root borer beetle	A	--	c	
Siuslaw sand tiger beetle	A	--	c	Coastal sand dunes and river bars
Taylor's checkerspot butterfly	A	--	b	Prairie remnants in Willamette Valley
Valley silverspot butterfly	A	--	b	Marys Peak; violets are host plant
Willamette callippe fritillary butterfly	A	--	c	Willamette Valley
Mammals				
American marten	A	SC	a	Rare in Coast Range and north Cascade Range
Reptiles				
Painted turtle	A	SC	a	Willamette Valley south to Corvallis; Columbia River Gorge
Sharptail snake	A	SV	a	Willamette Valley

¹ This list of species is being updated and will be published in the Salem District Resource Management Plan Record of Decision.

² E = Endangered; T = Threatened; P = Proposed; PE = Proposed Endangered; C2 = Taxa for which information now in the possession of the U.S. Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules; 3C = Taxa that have proven to be more abundant or widespread than previously believed and/or those that are not subject to any identifiable threat. If further research or changes in habitat indicate a significant decline in any of these taxa, they may be reevaluated for possible inclusion in categories 1 or 2; S = Bureau Sensitive; A = Bureau Assessment

³ E = Endangered; T = Threatened; SC = Sensitive Critical; SV = Sensitive Vulnerable; SP = Sensitive Peripheral or Naturally Rare

⁴ a = Known to occur - breeds within planning area; b = Known to occur - migrates through or into planning area; c = Suspected to occur (historical records, no recent documented sightings).

Sources: U.S. Department of the Interior, Fish and Wildlife Service 1993; Oregon Natural Heritage Program 1993.

Peregrine Falcon

The peregrine falcon is an endangered species on the federal threatened and endangered species list. A recovery plan (U.S. Department of the Interior, Fish and Wildlife Service 1982) has been prepared for the peregrine falcon and is being implemented.

The peregrine falcon prefers tall cliffs located near water, with ledges, potholes, or small caves suitable for constructing a nest scrape (U.S. Department of the Interior, Fish and Wildlife Service 1982). Areas frequented by shore birds, pigeons, and waterfowl provide ideal feeding areas for peregrines.

There is one active eyrie within the planning area, but none is known on BLM-administered lands. Occasional sightings of peregrines (including Yaquina Head) are made during the winter months, but these are thought to be migrant birds. The recovery plan is being used to guide resource management actions.

Northern Spotted Owl

The northern spotted owl is a threatened species on the federal threatened and endangered species list. Research and monitoring of spotted owls in California, Oregon, and Washington indicate the spotted owl is primarily associated with old-growth and mature forest types (Barrows 1981, Barrows and Barrows 1978, Carey 1985, Forsman 1976, 1980, Forsman and Meslow 1985, 1986, Forsman et al. 1977, 1984, 1987, Garcia 1979, Gould 1977, Gutierrez 1985, Marcot and Gardetto 1980, Meslow and Miller 1986, Postovit 1977, Solis and Gutierrez 1982). Recent work by Meyer et al. (1992) indicated that known owl sites selected at random contained more old growth, larger average size of old-growth patches, and larger maximum size of old-growth patches than occurred in landscape locations selected at random.

Spotted owls commonly nest in cavities 50 or more feet above the ground in large, decadent old-growth trees (Forsman et al. 1984, Gutierrez 1985). Other nest sites include large mistletoe clumps and platforms formed by whorls of large branches. Meyer et al. (1992) found that spotted owl reproduction in four of sixteen multiple regressions was correlated to the combination of distance to nearest owl pair and density of owl pairs. These preliminary results may indicate that areas with more old-growth habitat and spotted owls have better reproduction than in areas with low availability of old growth and few spotted owls.

The abundance of prey and habitat with structural features favorable for foraging are important factors in preference for old growth (Carey et al. 1986, 1986a, Forsman et al. 1984, Raphael and Barrett 1984, and Raphael et al. 1986). Spotted owl habitat must be capable of supporting the bushy tailed wood rat, red tree vole, flying squirrel, snowshoe hare, deer mouse, and western red-backed vole. The spotted owl's preference for roosting in mature and old-growth forests (Forsman 1980, Marcot and Gardetto 1980) may be a response to the owl's needs for thermoregulation (Barrows 1981). However, avoidance of great horned owls, a major predator of spotted owls, may also be an important factor. Although spotted owls prefer older forests for roosting, they are known to roost in hardwoods and second-growth stands near old-growth stands.

Spotted owls are also known to use the late seral stage for foraging and nesting if suitable nest substrate and prey habitat are available. Spotted owl use of this stage appears dependent on the presence of old-growth habitat components. This indicates that habitat structure, in addition to stand age, is an important factor in selection of habitat (Forsman 1976, Forsman and Meslow 1986, Forsman et al. 1977, 1984, Garcia 1979, Meslow and Miller 1986, Postovit 1977, and Vincent 1986). Although late seral stage habitat is used by spotted owls, spotted owl densities are less in this stage than in old-growth (Forsman 1976, Forsman and Meslow 1986, Forsman et al. 1977, 1984, Garcia 1979, Meslow and Miller 1986, Postovit 1977, and Vincent 1986).

Published home range sizes of individual spotted owls vary from 600 acres to more than 19,000 acres (Allen and Brewer 1985, Allen et al. 1987, Brewer 1985, Forsman et al. 1984, Forsman and Meslow 1985, 1986, Meslow and Miller 1986, Reid et al. 1987, Sisco and Gutierrez 1984, and Solis 1983). Little is known about the factors influencing home range selection and size, although habitat quality fragmentation and structure probably play a major role (Carey 1985, Dawson et al. 1986, Forsman et al. 1984, Forsman and Meslow 1986, and Gutierrez 1985). Spotted owls in Washington and northern Oregon appear to have larger home ranges than in southern Oregon and northern California.

Forest stands at least 80 years old are suitable habitat for spotted owls as described by Thomas et al. (1990). There are about 132,600 acres of this habitat on BLM-administered lands in the planning area.

About 50 percent of the planning area has been inventoried for spotted owls. Intensive inventory/monitoring commenced in 1985 and is continuing annually. Two density study areas have been established to determine the total density of spotted owls within prescribed areas. Some radio telemetry work has also been conducted. One hundred-twelve spotted owl sites have been identified in the planning area (see map 3-5). In 1993, 43 of 104 sites visited were occupied by pairs of spotted owls; 40 by singles; 21 sites were unoccupied. Owls have been captured and leg banded since 1986. Through 1993, approximately 269 owls have been banded, including 102 juveniles and 167 adults and sub-adults.

Recent demographic studies by K.P. Burnham, D.R. Anderson, and G.C. White (see SEIS appendix J) examined the key factors that influence population growth in spotted owls. Two key factors investigated in this analysis (which are referred to as vital rates) were survival rates of owls and productivity of female owls (which is referred to as fecundity, an estimate of the number of female offspring produced by resident females in the population). Estimates for survival rates and fecundity rates were used in calculations to determine the rate of population growth for spotted owls in each of the 11 demographic study areas (including Salem District data). In this type of calculation, a rate of 1.0 indicates a population that is neither increasing nor decreasing. That is to say, the factors that increase population size (such as births and immigration) are in balance with the factors that reduce population size (such as deaths and emigration). A rate that is greater than 1.0 indicates a population that is increasing, while a rate of less than 1.0 indicates a population that is decreasing. A population growth rate of 0.99 represents a population that is declining at one percent per year.

Results of the current analysis reiterate many of the findings of the *Final Draft Recovery Plan for the Northern Spotted Owl* (U.S. Department of the Interior, Fish and Wildlife Service 1992a unpublished). The three primary findings in the current analysis are:

- survival rates of adult female owls show a significant downward trend over the period of this study (1985-1993);
- the estimated rate of population growth averaged for all 11 study areas was significantly less than 1.0 (indicating a declining population throughout the owl's range); and
- the rate of population decline is likely to be accelerating in recent years.

The only study area that showed an estimated population growth rate above 1.0 was Salem District. However, this estimate did have the largest standard error of all the study areas, indicating a relatively high degree of uncertainty with this estimate. The data used for these analyses were derived from standardized field methods which have certain inherent limitations that may bias the estimates of the vital rates presented in this analysis. In regard to the Salem District data used in this analysis, biases in the data would result in optimistic estimates of fecundity rates, and therefore, optimistic estimates of population growth.

Bald Eagle

The bald eagle is a threatened species on the federal threatened and endangered species list. Bald eagles in the Pacific Northwest nest in large old-growth trees primarily in ponderosa pine, mixed-conifer, Douglas-fir, and Sitka spruce/western hemlock forest types (Anthony et al. 1982). Some nesting occurred along large river systems where black cottonwood was the selected tree species. Anthony and Isaacs (1988) indicated that 84 percent of the nests were within one mile of large bodies of water. Nest trees were found to be the larger, dominant or codominant trees in the stand and were usually components of old-growth or old-aged second-growth forests (Anthony and Isaacs 1988). These authors believed bald eagles were using trees for nesting that were larger and older than those produced under 80 to 100 year timber rotation systems. The nest trees selected usually have an open view of the area, a clear flight path to and from the tree, and suitable perch trees nearby.

Anthony et al. (1982) described communal night roost characteristics in the mixed conifer and Douglas-fir types. In both cases, the roost trees were larger than other trees in the surrounding forest. In specific studies, Stalmaster (1981) and Keister (1981) showed the existence of more favorable microclimates in communal roost areas than in adjacent forest stands. This aids in energy conservation by the birds.

Bald eagles feed primarily on fish during the spring and summer but may shift to waterfowl and carrion during the winter.

There are seven known nesting sites of bald eagles on BLM-administered lands in the planning area. Five of the sites are active, and two are inactive. In addition, there are two known communal night roosts on BLM-administered lands. The *Working Implemen-*

tation Plan for Bald Eagle Recovery in Oregon and Washington (Washington Department of Wildlife 1989) is being used to guide resource management actions by the cooperating agencies including BLM. Annual inventories and monitoring of bald eagle nest and roosting sites are conducted. Two site-specific management plans have been completed.

Marbled Murrelet

The marbled murrelet was officially listed as a threatened species in Washington, Oregon, and California on September 23, 1992. From southeast Alaska southward, marbled murrelets prefer to nest on the largest branches of older-aged (greater than 80 years) forest trees (Nelson 1993). Twenty-five known nests in the Pacific Northwest have been found on trees greater than 34 inches diameter at breast height and 147 feet tall. Eggs are laid on large limbs or other broad surfaces provided by thick moss, branch deformations generated by disease or past damage to the nest tree, and platforms created where two branches come together (Pacific Seabird Group 1993). Such branch characteristics most commonly occur in old-growth (more than 200 years old) stands. Murrelet chicks need protective cover for survival since cryptic coloration is their only other form of defense. Nesting success at 19 of the 25 known nest sites has been low. This is primarily due to predation by the great horned owl, common raven, and Stellar's jay. Nesting success was unknown at the other six sites. Stands with medium to high canopy cover levels primarily within 25 miles of the coast were preferred for nesting. Larger forest stands are thought to be preferred over small stands because they provide more nesting opportunities, more interior habitat, and less edge. Suitable nesting habitat includes large trees, generally over 32 inches diameter breast height, with the presence of potential nest platforms. Nesting habitat includes the forest stand in which the nest trees are contained, and include contiguous mature and old-growth forest. The amount of suitable habitat was classified according to two zones (Zone 1, 0 to 35 miles from coast and zone 2, 35.1 to 50 miles from coast). Estimates of suitable habitat included 26,785 and 1,269 acres for zone 1 and zone 2, respectively.

Inventories conducted by Oregon State University and BLM Salem District biologists since 1988 have found marbled murrelet occupancy in at least 19 stands comprising about 1,495 acres. These occupied stands are scattered throughout the Coast Range. Four nest sites comprising 235 acres have been located in the Yamhill Resource Area. Marbled

murrelet activity is concentrated in and around stands of older trees in the Salem District. Annual inventories and monitoring are continuing.

Western Snowy Plover

The coastal population of the western snowy plover is listed as a threatened species on the federal threatened and endangered species list. Snowy plover nesting habitat is typically flat, open, sandy areas on dune-backed beaches, sand spits at river outlets, flats east of foredunes, and on dredge spoils (Wilson-Jacobs and Meslow 1984, Woolington 1985).

Potential nesting habitat is very limited and has been impacted by plantings of European beach grass, Scotch broom, and lodgepole pine. The western snowy plover has not been observed on BLM-administered lands in the planning area.

Oregon Silverspot Butterfly

The Oregon silverspot butterfly is a federally listed threatened species. The caterpillars are dependent upon a single species of violet as a food source and seek out well hidden, sheltered sites when they are ready to pupate. Adults require nectar provided by flowering plants and cover provided by forested sites adjacent to the meadows. Only two populations are known, one in a coastal salt spray meadow and one on Mt. Hebo in the Coast Range. None are known on BLM-administered lands.

Cascades Frog

The Cascades frog is a candidate species on the federal threatened and endangered list. Primary habitats are streams, bogs, and ponds with aquatic vegetation, rocks, and logs above 2,600 feet elevation. One known site is on BLM-administered lands in the Clackamas Resource Area.

Foothill Yellow-legged Frog

The foothill yellow-legged frog is a candidate species on the federal threatened and endangered list. Primary habitats include open, sunlit ponds and low to moderate gradient streams, normally fourth order or larger with a gravelly or rocky substrate. This species is not known to venture far from water in contrast to the red-legged frog. This species may occur in ponds and streams within the district, but inventory data are lacking. No known sites occur in the Salem District.

Larch Mountain Salamander

The Larch Mountain salamander is a candidate for listing on the federal threatened and endangered species list. The salamander is considered rare in Oregon because of its limited range and habitat destruction caused by urbanization and road construction. The Larch Mountain salamander prefers dense stands of Douglas-fir with considerable moss and humus.

This habitat is usually in association with lava talus slopes of Columbia River basalt or Cascade andesite. Moist soils are preferred substrates. Isolated tracts in Multnomah County fall within the range of this species and are considered potential habitat. There are no known Larch Mountain salamander habitat sites on BLM-administered lands in the planning area.

Northern Red-legged Frog

The northern red-legged frog is a candidate species on the federal threatened and endangered list. Red-legged frogs prefer ponds and low-gradient streams generally at elevations below 2,000 feet. Breeding sites provide moisture, food, and refuge from non-aquatic predators.

Red-legged frogs use rodent holes to retain body moisture during periods of low relative humidity (Applegate 1991). The red-legged frog has recently become scarce in the Willamette Valley (St. John 1987). It seems to be absent from most streams and ponds in western Oregon (Applegate 1991). The reason for this decline is not clear (Hays and Jennings 1986). However, the presence of introduced sport species such as bass, bluegill, and bullfrog, usually corresponds with the local absence of the red-legged frog (Applegate 1991). Red-legged frogs are known to occur on BLM-administered lands in the Salem District.

Spotted Frog

The spotted frog is a candidate for listing on the federal threatened and endangered species list. Throughout its range, the spotted frog seems to favor lakes and slow moving streams. Generally these frogs are associated with permanent water where the bottom is soft-mud or boggy which may be needed for hibernation. The spotted frog is scarce in western Oregon apparently due to the introduction of the bullfrog which preys on spotted frogs. In the past, spotted frogs were found at scattered locations at all elevations in western Oregon (Nussbaum et al. 1983). There remains a small possibility that an

isolated population of spotted frogs still survives in western Oregon. No sites are known to occur in the Salem District.

Harlequin Duck

The harlequin duck is a candidate for listing on the federal threatened and endangered species list. It winters along the Pacific Ocean shoreline in Oregon and nests along swift streams in interior Oregon. Two breeding locations have been identified in the Salem District on BLM-administered lands. Systematic inventories are currently being conducted.

Mountain Quail

The mountain quail is a candidate for listing on the federal threatened and endangered species list. The mountain quail is a permanent resident in western Oregon. It occurs in brushy hill and mountainous areas throughout the planning area. Preferred habitat is brush areas in cutovers, old burns, and along edges between dissimilar habitat types. Preferred food includes fruits, seeds, and vegetable matter. The species is commonly seen along roadsides in the planning area.

Northern Goshawk

The northern goshawk is a candidate for listing on the federal threatened and endangered species list. Goshawk nesting is believed to occur above the 1,900-foot elevation in the Cascade Range. Research indicates that the birds require dense overstories of mature or old-growth trees and sparse ground cover for successful foraging and nesting. These conditions generally apply to the nest site, nest stand, and forage area. Nests are typically in one of the largest trees in the nest stand. They are usually situated on large limbs, against the bole of the tree, beneath, or just above the lower branches of the tree canopy. Nest sites are usually on north exposures of gentle to moderate slope. Sites in steep topography are usually situated on benches, or at the bottom of steep slopes. Nest sites are often associated with quiet streams or springs (Coleman Crocker-Bedford 1990, Hall 1984, Reynolds et al. 1982, Reynolds 1983).

Goshawk nesting densities are approximately four pairs per township in suitable habitat (Reynolds 1983). Nest stands approximate 400 acres and are associated with large tracts (i.e., nearly 5,000 acres) of older forest for foraging (Coleman Crocker-Bedford 1990). Goshawks appear to be highly sensitive to environmental changes. For example, Coleman Crocker-Bedford (1990) determined that

large buffers did not maintain nesting when timber sales were conducted within the home range of the birds. They recommended managing for the species through extended (old-growth) rotations on a watershed basis in order to maintain 2,500 to 5,000 acres of older forest around nest sites at all times. Timber harvest activities that open forest canopies and encourage the development of dense vegetation on the forest floor appear to be detrimental to goshawk foraging, and hence reproduction.

The goshawk is believed to be scarce in the Salem District with only one historic nest site reported.

Pacific Fisher

The fisher is a candidate for listing on the federal threatened and endangered species list. Optimum habitat is provided by mature and old-growth forests, although use of younger successional stages also occurs (Marshall 1992). Large downed logs serve as denning sites. These logs are frequently found in older seral stages. Use of younger successional stages for reproduction may be possible however, provided that suitable denning sites are available. Depleted numbers of fishers may be at least partially due to timber harvesting of mature and old-growth timber and associated forest fragmentation. There have been no known fisher sightings on BLM-administered lands in the planning area.

Townsend's Big-eared Bat

The Townsend's big-eared bat is a candidate for listing on the federal threatened and endangered species list. This species feeds on flying insects in a variety of habitats in forested areas. Caves and cave-like structures are important habitat for the big-eared bat as winter hibernating sites and as roosts for summer nursery colonies. The species will also use abandoned mine tunnels and buildings. Other important habitat features include wet meadows, caves, estuaries, and riparian areas (Brown 1985). There is one known big-eared bat habitat site on BLM-administered lands in the planning area.

White-footed Vole

The white-footed vole is a candidate for listing on the federal threatened and endangered species list. The white-footed vole is primarily associated with coastal riparian zones, preferring alder and small streams (Maser et al. 1981). It uses a wide range of successional stages in moist riparian zones when dense vegetation and down woody debris is present. Common forest types used by this species besides

alder are Douglas-fir and western red cedar. There are no known white-footed vole habitat sites on BLM-administered lands in the planning area.

Western Pond Turtle

The western pond turtle is a candidate species on the federal threatened and endangered species list. Habitat of this species in western Oregon is permanent water generally under 2,000 feet elevation. Habitats are primarily within the Willamette Valley where BLM lands are scarce. Preferred habitat seems to be a combination of quiet and fairly clear water, emergent rocks or logs, some aquatic vegetation, and nearby sunlit ground. The turtle is found in ponds with soft bottoms, rocky pools and streams (Evensen 1948, Applegate 1991). Clear water probably favors this species because a major part of its diet consists of invertebrates that are visually located and pursued. The species lays its eggs in the ground in loose soil as far as 1,500 feet from water. Activities which are thought to have resulted in declines of pond turtles include: flood control, tillage and road construction adjacent to ponds, chemical drainage into ponds, removal of logs and rocks from stream channels, and introduction of exotic plants and animals (Applegate 1991). No known locations of this species occur on BLM-administered lands in the Salem District.

Oregon Slender Salamander

The Oregon slender salamander is on the BLM sensitive species list. It is Oregon's only endemic species. It occurs only on the west slope of the Cascade Range from the Columbia River south to Shadow Lake (near the Waldo Lake entrance road in southeastern Lane County). The species is associated with mesic Douglas-fir and hemlock forests within an elevation range of 50 to 4,400 feet (Applegate 1991). The species can be found beneath pieces of bark that have fallen from large trees. Several observations of this species have been made in the Santiam and Clackamas Resource Areas.

Fringed Myotis

The fringed myotis is a bat on the BLM sensitive species list. This species depends on undisturbed shelter usually in rocky situations to successfully reproduce and hibernate. The fringed myotis uses old-growth forests as foraging sites for flying insects. No known locations of this species occur in the Salem District.

Clouded Salamander

The clouded salamander is on the BLM assessment species list. The clouded salamander inhabits forests and woodlands. It is associated with down woody debris and talus. It prefers large fallen Douglas-fir trees which are the product of old-growth forests (Whitaker et al. 1986). Eggs are laid in rotting Douglas-fir logs (Green and Campbell 1984). The clouded salamander seems to be widespread in the Salem District.

Tailed Frog

The tailed frog is on the BLM assessment species list. Tailed frogs live in cold, high gradient, even torrential mountain streams. They are generally absent from streams with elevated water temperatures and increased siltation (Nussbaum et al. 1983). Tailed frogs occur in both the Coast and Cascade ranges in the Salem District. They have been frequently caught during fish shocking operations. Populations have been found in old-growth stands and in harvest units that have regenerated to brush and young conifers.

Great Gray Owl

The great gray owl is on the BLM assessment species list. It apparently is expanding its range into western Oregon Douglas-fir forests. It is primarily found in higher elevation forests of the Cascade Range in western Oregon. The species prefers old-growth structural components of forest stands. No known locations of this species occur on BLM-administered lands in the Salem District.

Northern Saw-whet Owl

The northern saw-whet owl is on the BLM assessment species list. It is a secondary cavity nester that requires natural cavities or cavities excavated by woodpeckers in snags for nesting and roosting (Jones and Stokes Associates 1980). Saw-whets primarily use mature and old-growth successional stages of coniferous forest for nesting. Foraging occurs in younger seral stages. Saw-whets have been frequently encountered during spotted owl surveys and are recorded on data sheets when observed.

Pileated Woodpecker

The pileated woodpecker is on the BLM assessment species list. Mellen (1987) found that this species requires large snags for nesting (e.g., a mean diameter of 28 inches diameter at breast height and

83 feet tall). These snags must be within, or beneath, a relatively dense forest canopy. It nests extensively in Douglas-fir stands in trees generally with broken tops. In Mellen's study, the bird selected mature forest and deciduous hardwood stands, and avoided conifer stands less than 40 years old. Habitat for this species is believed to be declining due to current low rates of snag retention during logging, and the rapid decline of mature and old-growth forests. Many observations of pileated woodpeckers have been recorded within the planning area.

Purple Martin

The purple martin is on the BLM assessment species list. Purple martins are colonial, cavity nesters and, under natural conditions, often nest in snags in forest openings (Jackman and Scott 1975). Forest management practices including the suppression of fires and clearcutting without snag retention have reduced natural nesting cavities and nesting opportunities (U.S. Department of the Interior, Fish and Wildlife Service 1985). Several isolated populations have been observed in the past in the Salem District.

Western Bluebird

The western bluebird is on the BLM assessment species list. This species is a cavity nester that uses natural cavities and old woodpecker holes in standing dead trees (Jackman and Scott 1975). Western bluebirds prefer snags in forest openings and are known to nest on BLM-administered lands. The western bluebird has declined in numbers apparently due to the changing patterns of human land use (Power 1989). According to the U.S. Fish and Wildlife Service (U.S. Department of the Interior, Fish and Wildlife Service 1985), suppression of wildfire has ended the periodic renewal of bluebird habitat, and intensive forest management has eliminated snags. Western bluebirds have been observed using BLM-administered lands in the planning area.

American Marten

The marten is on the BLM assessment species list. Martens use snags, logs, and windfalls for foraging and denning. This species requires a minimum of one square mile of mature and old-growth forest for optimum winter cover and forage habitat for one pair of martens (U.S. Department of the Interior, Fish and Wildlife Service 1985). Martens are thought to be declining due to harvesting of mature and old-growth forest and associated impacts of forest fragmentation. Marshall (1992) reported this species to be most common in the central and southern Cascade Range

in western Oregon. According to Marshall (1992), a few marten were trapped in Benton and Lincoln Counties and there are a few roadkill records for the Coast Range in the 1980s. Although the Salem District lies within the historic range of this species, no recent observations have been made on BLM-administered lands.

Painted Turtle

The painted turtle is on the BLM assessment species list. This species occurs almost exclusively within the Willamette Valley and is not usually associated with conifer ecosystems at mid to high elevation. No known locations occur on BLM-administered lands in the Salem District.

Sharptail Snake

The sharptail snake is on the BLM assessment species list. This species occurs in scattered populations at low elevations (below 1,500 feet) in and near the Willamette Valley. It occurs in Douglas-fir forests and where oaks are a partial to dominant component of the forest stand. It is found under moist rotting logs, moist talus, and under rocks, boards or other objects (Marshall 1992). Populations are rare and declining in the Willamette Valley where only relict populations remain. Marshall (1992) considers that suitable habitat occurs in the Salem District.

Fish

The Oregon chub is a federally listed endangered species but is not known to inhabit streams in the Salem District.

In the planning area, certain groups/stocks of fish, including coastal coho and steelhead, Clackamas River coho, and Columbia/Willamette steelhead, are currently being considered by the National Marine Fisheries Service for threatened or endangered status. These fish groups/stocks are category 2 species (C2).

The chum salmon is a bureau assessment species, but very little habitat occurs on Salem District-administered lands.

In the planning area there are seven species of fish on the state's sensitive species list. Of the seven species, five are found in streams with adjacent BLM-administered land. They are chum salmon, *Oncorhynchus keta*; coho salmon, *O. kisutch*; chinook salmon, *O. tshawytscha*; coastal cutthroat trout, *O. clarki*; and Pacific lamprey, *Lampetra tridentata*. Two species, the bull trout, *Salvelinus*

confluentus, and the Oregon chub, *Oregonichthys crameri*, are not known to inhabit streams on BLM-administered lands.

SEIS Special Attention Species

Animal Species Groups

(Invertebrates - Arthropods and Allies,
Mollusks; Amphibians and Reptiles;
Bats; Mammals Other Than Bats; Early
Successional Species)

The Salem District has not conducted intensive or extensive surveys to assess the abundance and distribution of these species groups. The district has developed a database to record locations of species, but the records are largely for vertebrates rather than invertebrates at this time. Additional information on these groups is in appendix F of this proposed resource management plan and in the SEIS (p. 3&4-158 to 3&4-190).

Fish

The SEIS listed 257 stocks of salmon, steelhead, and sea-run cutthroat that are at risk of extinction or of special concern. Of these, 104 salmonid stocks occur within the BLM districts in western Oregon. Of these, a total of 54 stocks occur in streams managed by the Salem District in the lower Columbia, Willamette and north-coastal basins. These include coastal coho and coastal steelhead. The majority of these stocks (44) are found in coastal streams between and including, the Alsea River on the south to the Nehalem River on the north (see table 3-25).

Table 3-25 Stocks At Risk in the Salem District

Race/Species	Stocks
Spring/summer chinook	Alsea (spring); Siletz (spring, summer); Nestucca (spring); Tillamook Bay-Trask (spring); Wilson (spring); Kilchis (spring); Nehalem (summer); Columbia-Willamette (spring); Sandy (spring)
Fall chinook	Yachats; Beaver Creek; Yaquina; Drift Creek (Siletz Bay); Schooner Creek; Salmon; Columbia-Sandy, Lower Columbia small tributaries
Coho	Small Oregon coastal streams; Yachats; tributaries south of Alsea; Alsea; Drift Creek (Alsea); tributaries north of Alsea; Beaver Creek; Yaquina; Schooner Creek; Siletz; Drift Creek (Siletz Bay); Salmon; Nestucca; Little Nestucca; tributaries south of Tillamook Bay; Tillamook Bay; small Tillamook Bay tributaries; Trask; Wilson; Kilchis; Tillamook; Nehalem; Upper Nehalem; Willamette-Clackamas; Sandy; Lower Columbia tributaries
Chum	Yachats; Alsea; Yaquina; Siletz; Drift Creek (Siletz Bay); Salmon; Nestucca; Little Nestucca; Tillamook Bay; Kilchis; Wilson; Trask; Tillamook; Lower Columbia small tributaries
Winter steelhead	Yachats; Alsea; Yaquina; Siletz; Salmon; Nestucca; Tillamook Bay; Kilchis; Wilson; Trask; Nehalem; Willamette-Clackamas; Lower Columbia small tributaries
Summer steelhead	Siletz
Sea-run cutthroat	Oregon coastal streams; Lower Columbia small tributaries

Source: Appendix B, table B6-5, (U.S. Department of the Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994).

Special Areas

Special areas include areas of critical environmental concern and other areas allocated to uses such as environmental education. The district manages 22 special areas including 20 areas of critical environmental concern, totalling 11,858 acres; one environmental education area, totalling 183 acres; and several parcels in the Willamette River Greenway, totalling 76 acres. Of the 20 areas of critical environmental concern, six are also research natural areas, and six are outstanding natural areas. All existing areas of critical environmental concern were reviewed to determine whether they continue to meet relevance and importance criteria (see glossary). All of them except Big Canyon met the criteria.

Existing special areas are briefly described in table 3-27 and displayed on map 3-6.

During the resource management plan process, 28 candidate areas of critical environmental concern were identified and 22 were screened for further consideration in this proposed resource management

plan/final environmental impact statement. Screening reports are available for review in district special area files. As a result of this process plus public review of the draft resource management plan, 10 potential areas are being considered for possible area of critical environmental concern designation and management through this proposed resource management plan/final environmental impact statement. These areas are briefly described in table 3-28 and displayed on map 3-6. Two of the potential areas of critical environmental concern, Forest Peak and Shafer Creek, are proposed for designation as research natural areas. The decision to designate any or all of the potential areas of critical environmental concern will be part of the district's resource management plan decision, which will be made following completion of the proposed resource management plan.

Two potential special areas were identified for protective management through other than area of critical environmental concern designation. These areas are briefly described in table 3-29 and displayed on map 3-6.

Table 3-27 Existing Special Areas

Area	Size (acres)	Primary Resource Value/Description
Big Canyon ACEC / ONA (Washington County)	269	Botanical: Steep-sided canyon providing specialized botanical habitats, raptor nesting, scenic values, and riparian environment.
Carolyn's Crown ACEC / RNA (Linn County)	261	Botanical: Old-growth forest (400 to 600 years old) in a glacier-created cirque, high quality scenery, spotted owl occupation, uncommon botanical species composition.
Elk Creek ACEC (Tillamook County)	1,577	Wildlife: Bald eagle nest sites and habitat; spotted owl habitat.
Grass Mountain ACEC / RNA (Benton County)	726	Botanical: Oregon Coast Range grass bald complex.
High Peak-Moon Creek ACEC / RNA (Tillamook County)	1,538	Botanical: Old-growth forest (500 years old) mixed with younger coastal Douglas-fir in a wide range of settings. A number of natural plant community associations are represented.
Larch Mtn. Environmental Education Area (Multnomah County)	183	Botanical: Conifer forest area along the Larch Mountain road used by local schools.
Little Grass Mtn. ACEC / ONA (Lincoln County)	45	Botanical: Open grass/fern bald complex in the Oregon Coast Range.
Little Sink ACEC / RNA (Polk County)	80	Geologic: Geologic instability has resulted in slumping and created ponds, basins, benches, hummocks, and scarps; old-growth forest mixes with a variety of plant species.
Lost Prairie ACEC (Lincoln County)	58	Botanical: High elevation peak bog containing a number of uncommon plant species and a diversity of bog, pond, snag, prairie, and riparian habitats.
Marys Peak ACEC / ONA (Benton County)	104	Botanical: Unique botanical area on the Oregon Coast Range's highest peak; includes old-growth noble fir, grass balds and rock gardens.
Middle Santiam Terrace ACEC (Linn County)	108	Botanical: Old-growth forest (550 years old) on a major river terrace.
Nestucca River ACEC (Tillamook and Yamhill Counties)	5,300	Scenic, fish, wildlife, botanical, and recreational values on 11.6 miles of river.
Rickreall Ridge ACEC (Polk County)	177	Botanical: Rocky ridge supporting a wide variety of Coast Range plant species.
Saddleback Mtn. ACEC / RNA (Lincoln County)	151	Botanical: Relic population of 400 to 600 year old Pacific silver fir.

Table 3-27 Existing Special Areas (continued)

Area	Size (acres)	Primary Resource Value/Description
Sandy River Gorge ACEC / ONA (Clackamas and Multnomah Counties)	400	Botanical: Wide variety of plant communities within a roadless river gorge segment of the state designated Sandy River Scenic Waterway and federally designated wild and scenic rivers.
Sheridan Peak ACEC (Tillamook and Yamhill Counties)	299	Botanical: Habitat for <i>Poa maritima</i> (weak bluegrass) and <i>Poa laxiflora</i> (loose-flowered bluegrass), monitoring species.
Soosap Meadows ACEC (Clackamas County)	469	Botanical: Subalpine meadow-forest mosaic in the northwestern Oregon Cascade Range.
The Butte ACEC / RNA (Yamhill County)	40	Botanical: Diversity of microhabitats ranging from very xeric to mesic at margin of Coast Range and Willamette Valley.
Valley-of-the-Giants ACEC / ONA (Polk County)	51	Botanical: Old-growth forest (400 years old) in the Coast Range.
Willamette River Parcels ¹ (Linn, Benton, Marion, and Clackamas Counties)	76	Scenic: State-designated management area along the main stem of the Willamette River. BLM manages a few islands and shore areas within the greenway.
Williams Lake ACEC (Clackamas County)	98	Ecological: Lake and bog ecosystem undergoing peat bog/quaking bog succession and containing several specialized microhabitats.
Yaquina Head ACEC / ONA (Lincoln County)	106	Wildlife: Headland on the central Oregon coast includes scenic, botanical, wildlife, cultural, and recreational values.

ACEC = Area of Critical Environmental Concern

ONA = Outstanding Natural Area

RNA = Research Natural Area

¹ Includes potential Wells Island Area of Critical Environmental Concern.

Sources: Western Oregon Digital Data Base and Salem District special area files.

Table 3-28 Potential Special Areas

Area	Size (acres)	Primary Resource Value/Description
Alesea Bay Island Potential ACEC (Lincoln County)	10	Botanical: Low salt marsh island with estuarine plant and wildlife habitat.
Forest Peak Potential ACEC / RNA (Benton County)	134	Ecological: Mature Douglas-fir forest in Willamette Valley margin; stream with first to third order segments; diverse aquatic and terrestrial ecosystems.
North Santiam Potential ACEC (Linn County)	31	Ecological: Lowland alluvial forest and riverine cottonwood bottomland on a major Willamette River tributary containing a great blue heron rookery and other wildlife values.
Shafer/Crabtree Creek Potential ACEC / ONA / RNA (Linn County)	961	Ecological: Glaciation-phase plant ecology, old-growth forest (400 to 600 years old), lake, marsh, and cultural resource sites.
Walker Flat <i>Sidalcea</i> Potential ACEC (Yamhill County)	39	Botanical: Population of <i>Sidalcea nelsoniana</i> (Nelson's checkermallow), a rare plant species; wetland perimeter and wetland species in a palustine marsh complex.
Wells Island Potential ACEC (Polk County)	67	Ecological: Willamette River island exhibiting Willamette Valley flood plain ecological systems and containing habitat for <i>Sagittaria latifolia</i> .
White Rock Fen Potential ACEC (Linn County)	51	Botanical: Sphagnum bog and wetland complex creating diverse plant and animal habitats.
Wilhoit Springs Potential ACEC (Clackamas County)	170	Botanical: Valley bottom old-growth conifer forest in the northern Willamette Valley includes grand fir, Douglas-fir, and western redcedar with some scattered old growth. Cultural features from a historic resort site are present. <i>Oligocene molluscan</i> fossils also occur on this parcel.
Yampo (Eola Hills) Potential ACEC (Yamhill County)	13	Botanical: Willamette Valley foothill riparian and upland environment containing native plant species representing a specific seral stage (nonclimax) favoring <i>Lathyrus holochlorus</i> , <i>Cimicifuga elata</i> , and tall bugbane are also found on the site.
Yellowstone Creek Potential ACEC (Linn County)	112	Scenic: Numerous waterfalls and cascades in a V-shaped canyon with old growth; Scenic quality "A" classification.

ACEC = Area of Critical Environmental Concern

ONA = Outstanding Natural Area

RNA = Research Natural Area

Sources: Western Oregon Digital Data Base and Salem District special areas files.

Table 3-29 Potential Special Areas Other Than Areas of Critical Environmental Concern

Area	Size (acres)	Primary Resource Value/Description
A.J. Dwyer Potential Scenic Area (Multnomah County)	5	Botanical and scenic: Older forest along the Mt. Hood Highway (U.S. Highway 26) at Wildwood Recreation Site.
Eagle Creek Protection Area (Clackamas County)	580	Water quality: Relatively undisturbed riparian and upslope area immediately upstream from a national fish hatchery; highly dissected slopes.

Sources: Western Oregon Digital Data Base and Salem District special area files.

Cultural Resources Including American Indian Values

The planning area encompasses lands that fall into two different cultural areas - the Lower Columbia and the Coast, and the Willamette Valley. The cultural chronology and prehistory of each of these areas differ. Human occupation of the planning area may date back continuously for 12,000 years. A variety of occupation sites represents a wide range of human activities over this time span. These sites range from permanent village sites to seasonal residence and resource/activity specific sites. A number of aboriginal trails link the coast, Willamette Valley, Columbia River, and eastern Oregon areas. Evidence of dispersed land use (fewer than ten artifacts at one location) also occurs in the Cascade and Coast ranges. Sites of aboriginal religious significance also have been identified in the planning area.

BLM-administered lands in the planning area have been inventoried for cultural resources using a variety of procedures. There are 371 inventoried sites located on BLM-administered lands.

Sixty-eight prehistoric sites and thirty-two prehistoric isolated finds have been documented on BLM-administered lands. Four sites have been determined eligible for listing in the National Register of Historic

Places. Two of these sites are at Yaquina Head, and three are in Table Rock Wilderness. Four historic sites: Rock Corral, Barlow Road, Yaquina Head Lighthouse, and the Nehalem Divide Railroad Tunnel are listed in the National Register of Historic Places.

Historic records for the planning area date back to the 1770s and perhaps earlier. Ship-based and land-based exploration occurred for a number of years, followed by fur trade activities and more thorough exploration. Settlement was well underway in the 1840s, and confinement of Indians to reservations was completed in 1857. Historic development of planning area lands included homesteading, mining, reservation-era American Indian use, recreation, grazing, logging, fire protection, and federal government actions and activities. Sites representing these historic activities include roads, trails, structures, engineering facilities, railroads, and early logging sites.

The tip of Yaquina Head is a significant site to the Confederated Tribes of Siletz Indians. The area in and around Table Rock Wilderness was traditionally used by Warm Springs Indians for huckleberry picking until the 1930s. Two other locations with possible significance to American Indians, Marys Peak and the upper Kilchis River reaches, may include BLM-administered lands.

Visual Resources

BLM-administered lands have been inventoried, evaluated, and assigned inventory classes according to their relative worth from a visual resource management point of view. There are four visual resource inventory classes established by the BLM manual (U.S. Department of the Interior, BLM, OSO 1986). Objectives for each class are used to identify management prescriptions that would maintain, enhance, or preserve scenic values. These objectives and management prescriptions are described in chapter 2. Of all BLM-administered lands inventoried in the district, approximately 4 percent is class I, 14 percent is class II, 15 percent is class III, and 67 percent is class IV. Acreages of each inventory class are listed in table 2-1 (alternative D column), and the classes are delineated on map 3-7. Approximately 53 percent of the mapped areas have fragmented land ownership patterns. Non-BLM-administered lands dominate the landscape.

Representative class I areas are the Valley-of-the-Giants Area of Critical Environmental Concern, Table Rock Wilderness and more than 60 waterfalls. Class II areas include Marys Peak Road, U.S. Highway 26 (Mt. Hood) and the Quartzville Access Road. Lands along most county roads in rural residential areas, such as the Lyons-Mill City area, are class III; lands along most logging access roads and in other seldom seen areas are class IV.

Wild and Scenic Rivers

The BLM manages land along four river segments designated by Congress as components of the National Wild and Scenic Rivers System. These segments are described and displayed in table 3-30 and on map 3-8.

Fifty-five other river segments, including 13 listed in the National Park Service's 1982 Nationwide Rivers Inventory (U.S. Department of the Interior, National Park Service 1982), were considered for their potential as additions to the National Wild and Scenic Rivers System. To accomplish this, the BLM used a three-step process. The first step was to determine segment eligibility based on free-flowing conditions and presence or absence of outstandingly remarkable values. The second step was to determine tentative classification (wild, scenic, or recreational river area) based primarily on segment character and development levels. Both of these steps were completed in 1990. The third step was to complete a suitability assessment for all river segments with corridors comprised of 40 percent or more BLM-administered lands. Final decisions regarding wild and scenic river designation are solely reserved by Congress.

The specific guidelines for determining segment eligibility and classification were developed by the western Oregon districts and approved by the BLM's Oregon state director in 1989. The *Department of the Interior - Department of Agriculture Final Revised Guidelines for Eligibility, Classification and Management of River Areas* (1982) served as the framework around which these western Oregon guidelines were fashioned. The eligibility and classification determinations considered lands in a corridor extending one-quarter mile on each side of inventoried river segments measured from the ordinary high water mark.

Of the 55 inventoried river segments considered in the process, 37 met the eligibility criteria for designation. Because the corridors along eight of these eligible segments are comprised of 40 percent or more BLM-administered lands, an assessment of their suitability for inclusion as components of the National Wild and Scenic Rivers System has been completed for each in this proposed resource management plan. These segments are described and displayed in table 3-31 and on map 3-8.

Table 3-30 Designated Wild, Scenic, and Recreational River Areas

Area	Total Miles	Classification/Miles			BLM Acres	Primary Values of BLM-Administered Lands
		Wild	Scenic	Rec.		
Clackamas River (Clackamas County)	47.0	--	20.0	27.0	248	Located within a segment classified as recreational. Part of general landscape upslope from river.
Quartzville Creek (Linn County)	9.7	--	--	9.7	1,646	Intensive recreation use (recreational mining, sightseeing, pleasure driving, camping and picnicking) in a highly scenic river corridor.
Salmon River (Clackamas County)	33.5	15.0	11.8	6.7	515	Located within segments classified as scenic and recreational. Intensive recreation use (picnicking, hiking, studying nature, swimming and fishing) and a heavily developed recreation site with day-use facilities.
Sandy River (Clackamas and Multnomah Counties)	24.9	4.5	3.8	16.6	518	Located within segments classified as scenic and recreational. Dispersed recreation use (hiking, fishing, boating and studying nature) in a highly scenic river corridor. Heavily developed county park under Recreation and Public Purposes lease has intensive recreation use (camping, picnicking, hiking, fishing, swimming, biking, and studying nature).

Source: Salem District recreation inventory records.

Table 3-31 Wild and Scenic River Segments Assessed for Suitability

River	Highest Tentative Classification	ORVs ¹	Miles	Percent BLM
Crabtree Creek (segment A)	Scenic	S,R,W,C,E	2.2	100
Elkhorn Creek	Wild	S,W	3.0	90
Lobster Creek (segment A)	Recreational	F	4.6	100
Molalla River (segment B)	Recreational	S,R,G	12.4	84
Nestucca River (segment A)	Recreational	S,R,F	15.3	72
North Fork Alsea River	Scenic	S,F,W	10.7	53
South Fork Alsea River	Recreational	G	16.4	65
Walker Creek	Recreational	E	2.5	54

¹ ORVs = Outstandingly Remarkable Values:

S = scenic; R = recreational; G = geologic; F = fish; W = wildlife; C = cultural; E = ecological/botanical

Source: Western Oregon Digital Data Base.

Wilderness

The Table Rock Wilderness was designated a component of the National Wilderness Preservation System with the enactment of the Oregon Wilderness Act on June 26, 1984. The 5,800-acre area is the only BLM-managed wilderness within the planning area (see map 3-9). It is administered under the provisions of a wilderness management plan approved by the BLM's Oregon state director in February 1987. Within available funding levels, the wilderness management program detailed in the plan is being implemented following a set schedule. All BLM-administered lands adjacent to Table Rock Wilderness are managed under the principles of ecosystem management.

There is potential to slightly adjust the exterior boundary of Table Rock Wilderness to create a more easily identifiable on-the-ground boundary location and to incorporate acreage needed for better wilderness management. This potential adjustment would involve BLM-administered lands in the Camp Creek drainage and in the vicinity of the existing Pechuck Lookout Trailhead. Approximately 350 acres could be added to the wilderness area's total size. Any boundary adjustment will ultimately require Congressional action.

Recreation

The major recreation activities occurring on BLM-administered lands in the planning area are camping, picnicking, hiking, horseback riding, boating, pleasure driving, hunting, fishing, and driving recreation vehicles on and off roads. Some of this activity is concentrated in developed recreation sites. Most is dispersed recreation activity occurring on roads, rivers, and undeveloped forest lands.

Based on resource management planning guidance established in November 1986, all BLM-administered land is categorized into two distinct types of recreation management areas: special recreation management areas and extensive recreation management areas. These categories were not used in the 1983 management framework plans. However, special recreation management areas and extensive recreation management areas are an integral part of the inventory for the 1990s resource management plan. Typically, special recreation management areas are sites or areas requiring substantial recreation investment and/or more intensive recreation management. The special recreation management area identification is applied to high-use recreation sites, wilderness areas, wild and scenic rivers, and large areas where the provision of recreation opportunities is a principal management objective. There are seven existing and seven potential special recreation management areas in the planning area. These special recreation management areas are described in table 3-32 and table 3-33 respectively, and displayed on map 3-9.

Extensive recreation management areas cover all land not included within special recreation management area boundaries and account for approximately 96 percent of planning area acreage. The majority of 1993 recreation visitation on BLM-administered lands occurred in the district's five existing extensive recreation management areas: Alsea (approximately 79,900 acres and 477,500 visits); Clackamas (approximately 71,300 acres and 41,600 visits); Santiam (approximately 85,400 acres and 204,500 visits); Tillamook (approximately 60,700 acres and 210,000 visits); and Yamhill (approximately 86,300 acres and 112,000 visits). There are no potential extensive recreation management areas in the planning area.

Within the planning area there are 12 BLM-developed and -managed recreation sites, 26 miles of developed hiking/horseback riding trail, 680 miles of streams fishable for trout and salmon, approximately 200,000 acres legally accessible to the public, and 2,195 miles of BLM-controlled roads open to motor-

ized travel. There are also six sites and two areas managed for recreation by other government agencies under Recreation and Public Purposes leases from the BLM.

A recently initiated program within BLM is the designation and management of national back country byways. The intent of this program is to identify and publicize scenic driving opportunities on lesser traveled roads through BLM-administered lands. Byway designation is not a land-use allocation, and resource management on both public and private lands through which the byways traverse is not affected. There are two existing byways in the planning area, an 11-mile segment of the South Fork Alsea River Road and an 11-mile segment of the Nestucca River Road. Potential additions to the byway system include a 15-mile segment of the Quartzville Road and extensions to the Nestucca River byway.

Existing and potential recreation sites are described in tables 3-34 and 3-35 and displayed on map 3-9. Existing and potential recreation trails are described in tables 3-36 and 3-37 and displayed on map 3-9.

Recreational use of BLM-administered lands in the Salem District, including all activities within existing special recreation management areas and extensive recreation management areas, was estimated at 2,387,400 recreation visits in 1993. This use estimate was based on data presented in the *1988 Statewide Comprehensive Outdoor Recreation Plan for Oregon* (Oregon Parks and Recreation Department 1988) as revised. It is the most recent database available for estimating existing districtwide recreational use. The Statewide Comprehensive Outdoor Recreation Plan estimates were prorated to lands under BLM jurisdiction based on percent of forest land administered by BLM in the region.

Table 3-38 shows total 1993 recreation visits to BLM-administered lands for 11 use categories. Motorized travel visits (sightseeing and exploring) and other land-based visits (nature study, wildlife observation, outdoor photography, visiting interpretive displays, and picnicking) accounted for 50 percent of total visitation. They were the most popular recreation activities occurring on BLM-administered lands in 1993. Nonmotorized travel visits (visiting the beach/beachcombing, day and overnight hiking/backpacking on trails, bicycling, and horseback riding) and overnight camping visits accounted for another 26 percent. No other use category accounted for more than six percent of total 1993 visitation.

Table 3-32 Existing Special Recreation Management Areas

Special Recreation Management Area	Approx. Acres	Estimated 1993 Visits ¹	Description/Amenities
Fishermen's Bend (Marion County)	100	135,000	Highly developed BLM-managed recreation site located along the North Santiam River.
Nestucca River (Tillamook and Yamhill Counties)	5,300	195,900	State-designated scenic waterway segment paralleled by the BLM designated Nestucca River National Back Country Byway. River segment found suitable for inclusion as a component of the National Wild and Scenic Rivers System. Four BLM-managed recreation sites (Alder Glen, Elk Bend, Fan Creek, and Dovre) and several potential BLM recreation sites located along the river. There is potential to extend the national back country byway. Also includes existing Forest Service-managed recreation site (Rocky Bend) with potential to be transferred to BLM management.
Quartzville Creek (Linn County)	1,600	185,700	Congressionally designated component of the National Wild and Scenic Rivers System paralleled by the BLM potential Quartzville National Back Country Byway. Two BLM-managed recreation sites (Dogwood and Yellowbottom) and a BLM potential group-use area (Miner's Meadow) located along the creek.
Salmon River (Clackamas County)	500	309,500	Congressionally designated component of the National Wild and Scenic Rivers System. One highly developed BLM-managed recreation site (Wildwood) located along the river.
Sandy River (Clackamas and Multnomah Counties)	500	90,000	State-designated scenic waterway segment and Congressionally designated component of the National Wild and Scenic Rivers System. One highly developed Multnomah County-managed park (Oxbow) located along the river. Also includes the designated Sandy River Gorge Area of Critical Environmental Concern.
Table Rock (Clackamas County)	5,800	12,500	Congressionally designated component of the National Wilderness Preservation System located in the heart of the Molalla River drainage.
Yaquina Head (Lincoln County)	100	413,200	Congressionally designated outstanding natural area. Historic lighthouse and BLM-managed recreation facilities located along the Pacific Ocean.

¹ The most current recreation visitation estimates for BLM-administered special recreation management areas are for 1993.

Sources: Western Oregon Digital Data Base and Recreation Management Information System Data Base.

Table 3-33 Potential Special Recreation Management Areas

Special Recreation Management Area	Approx. Acres	Description/Amenities
Little North Santiam River (Marion County)	3,300	Popular recreational attraction for mid-Willamette Valley and North Santiam Canyon residents. Upper river a state-designated Scenic Waterway segment. Two BLM-managed recreation sites (Canyon Creek and Elkhorn Valley) located along the river, and a BLM potential recreation site near the river's confluence with Elkhorn Creek.
Marys Peak (Benton County)	2,300	Popular recreational attraction for mid-Willamette Valley residents, particularly from the Corvallis-Philomath vicinity. Designated BLM-managed area of critical environmental concern and designated Forest Service Scenic/Botanic Special Interest Area. Spectacular views of the Willamette Valley from the peak's top. Two BLM potential recreation sites near Parker Creek, and traversed by BLM potential Corvallis-to-the-Sea Trail.
Mill Creek (Polk County)	9,600	Low elevation and proximity to mid-Willamette Valley population centers heighten recreational values. One BLM potential recreation site located along the creek.
Molalla River/Table Rock (Clackamas County)	12,100	Incorporates entire existing Table Rock Special Recreation Management Area into potential area boundaries. Popular recreational attraction for mid-Willamette Valley and Portland metropolitan area residents, particularly from the Molalla-Woodburn vicinity. River segment found suitable for inclusion as a component of the National Wild and Scenic Rivers System. Four BLM-managed trailheads (Table Rock Wilderness) and a BLM potential recreation site located along the river.
Mt. Hood Corridor (Clackamas County)	2,600	Incorporates entire existing Salmon River Special Recreation Management Area into potential area boundaries. Popular recreational attraction for Portland metropolitan area residents and residents of the small communities scattered along U.S. Highway 26. One BLM-managed recreation site (Wildwood) and historic Barlow Road segment located along the Salmon River.
North Fork Siletz River (Lincoln and Polk Counties)	1,200	Designated Valley-of-the-Giants Outstanding Natural Area and adjacent old-growth forest habitat.
Yellowstone (Linn County)	39,700	Incorporates entire existing Quartzville Creek Special Recreation Management Area into potential area boundaries. Also incorporates BLM potential Quartzville National Back Country Byway, two other BLM-managed areas (Green Peter Peninsula and Crabtree Lake) identified in the draft resource management plan as potential special recreation management areas, and two BLM potential recreation trails - one extending from Green Peter Peninsula to Crabtree Lake, and the other extending from Snow Peak to the Willamette National Forest boundary.

Source: Western Oregon Digital Data Base.

Table 3-34 Existing Recreation Sites

Site	Existing Acres	1993 Visits ¹	Amenities
Alder Glen (Tillamook County)	2	5,400	10 family camping units (with restrooms, a fishing platform and one designated unit accessible to people with disabilities) on the Nestucca River.
Alsea Falls (Benton County)	25	7,500	16 family camping units and 21 family picnicking units on the South Fork Alsea River.
Canyon Creek (Marion County)	4	13,000	21 family picnicking units on the Little North Santiam River.
Dogwood (Linn County)	11	1,600	5 family picnicking units on Quartzville Creek.
Dovre (Tillamook County)	4	3,500	9 family camping units and one shelter unit (with restrooms accessible to people with disabilities) on the Nestucca River.
Elk Bend (Tillamook County)	4	1,000	3 family picnicking units on the Nestucca River.
Elkhorn Valley (Marion County)	64	16,500	23 family camping units on the Little North Santiam River.
Fan Creek (Tillamook County)	2	4,300	11 family camping units (with restrooms and one designated unit accessible to people with disabilities) on the Nestucca River.
Fishermen's Bend (Marion County)	141	45,000	38 family camping units, 12 family picnicking units, 3 group camping areas, 3 group picnicking areas with shelters, and a boat ramp with parking area on the North Santiam River.
Missouri Bend (Benton County)	3	4,000	12 family picnicking units and a boat launch facility on the Alsea River.
Wildwood (Clackamas County)	492	101,000	62 family picnicking units, 2 group picnicking areas with shelters, 8 group picnicking units, and a wilderness trailhead with parking area on the Salmon River.
Yellowbottom (Linn County)	14	8,300	22 family camping units and 6 family picnicking units on Quartzville Creek.

¹ The most current recreation visitation estimates for BLM-administered recreation sites are for 1993. Visitation estimates are derived from vehicle traffic counts at selected road locations, user fee envelopes collected at some developed recreation sites, and observations by district employees.

Sources: Western Oregon Digital Data Base and Salem District recreation inventory records.

Table 3-35 Potential Recreation Sites

Site	Potential Acres	Amenities
Alder Glen Expansion (Tillamook County)	2	Potential camping site on the Nestucca River.
Alsea Falls Expansion (Benton County)	55	Potential camping site on the South Fork Alsea River.
Bear Creek (Tillamook County)	3	Potential camping site on the Nestucca River.
Crabtree Lake (Linn County)	3	Potential day-use site near Crabtree Lake.
Dick's Ridge (Lincoln County)	35	Potential camping site (equestrian) and trailhead at Dick's Ridge stockpile site.
Elkhorn Creek (Marion County)	28	Potential camping site on Elkhorn Creek.
Green Peter Peninsula (Linn County)	153	Potential camping sites on the peninsula of Green Peter Reservoir.
Harry Mountain (Linn County)	10	Potential camping site (equestrian) and trailhead near Harry Mountain.
Hoag Pass (Tillamook County)	18	Potential camping site on the Nestucca River.
Mill Creek (Polk County)	24	Potential day-use site on Mill Creek.
Miner's Meadow (Linn County)	3	Potential group-use site (camping and day use) on Quartzville Creek.
Molalla River (Clackamas County)	39	Potential camping site on the Molalla River.
Parker Creek (Benton County)	87	Potential camping site on Marys Peak.
Quartzville Creek (Linn County)	15	Potential camping site on Quartzville Creek.
Rocky Bend (Tillamook County)	3	Existing U.S. Forest Service-managed recreation site with potential to be transferred to BLM management.
Sheridan Overlook (Yamhill County)	1	Potential day-use site at the abandoned rock pit on the Bald Mtn. Access Road.
Snow Peak (Linn County)	15	Potential camping site (equestrian) and trailhead near Snow Peak.
Table Rock Wilderness trailheads (Clackamas County)	88	Potential trailheads around the boundary of Table Rock Wilderness.
Trout Creek (Linn County)	5	Potential camping site on Quartzville arm of Green Peter Reservoir.
Valley-of-the-Giants Trailhead (Polk County)	1	Potential day-use site near Valley-of-the-Giants Outstanding Natural Area.
Willamina Creek (Yamhill County)	56	Potential camping and picnicking site on Willamina Creek.

Sources: Western Oregon Digital Data Base and Salem District recreation inventory records.

Table 3-36 Existing Recreation Trails

Trail	Existing Miles	1993 Visits ¹	Other Descriptive Information
Baty Butte/Silver King (Clackamas County)	5	10	Provides access from trailhead on BLM land near Joyce Lake to the vicinity of Baty Butte.
Boulder Ridge (Clackamas County)	2	2,000	Provides access from trailhead on BLM land within Wildwood Recreation Site to the Salmon-Huckleberry Wilderness.
Eagle Creek (Clackamas County)	0.5	1,000	Provides access from trailhead on BLM land to the Salmon-Huckleberry Wilderness.
McIntyre Ridge (Clackamas County)	0.6	800	Provides access from trailhead on BLM land to the Salmon-Huckleberry Wilderness.
Nasty Rock (Clackamas County)	1	25	Provides access from trailhead on BLM land to the vicinity of Nasty Rock.
Table Rock (Clackamas County)	16	3,000	Provides access from four trailheads on BLM land to Table Rock Wilderness.
Tillamook Off-Highway Vehicle (Tillamook County)	21	2,000	Motorcycle trail system.
Valley-of-the-Giants (Polk County)	1	1,500	Provides access from trailhead on BLM land through the Valley-of-the-Giants Outstanding Natural Area.

¹ The most current recreation visitation estimates for BLM-administered trails are for 1993. Visitation estimates are derived from pedestrian counts at selected trailhead locations and observations by district employees.

Sources: Western Oregon Digital Data Base and Salem District recreation inventory records.

Table 3-37 Potential Recreation Trails

Trail	Miles	Other Descriptive Information
Corvallis-to-the-Sea (Benton and Lincoln Counties)	30	Potential hike/bike/horse trail extending from Corvallis to the Pacific Ocean (traverses the Coast Range).
Crabtree Mountain (Linn County)	15	Potential trail would provide access from trailhead on BLM land on Green Peter Peninsula to Crabtree Lake.
Elk Creek (Tillamook County)	1	Potential interpretative trail in the Elk Creek drainage extending from Elk Creek Road to only remaining old-growth stand near BLM managed recreation sites.
Elkhorn Creek (Marion County)	3	Potential trail would traverse a relatively undisturbed stand of old-growth Douglas-fir, western hemlock and western redcedar.
Harry Mountain (Linn County)	21	Potential trail would extend from a potential Snow Peak Recreation Site to the Willamette National Forest boundary.
Little North Fork Wilson River (Tillamook County)	4	Potential interpretative trail along river.
Marys Peak (Benton County)	3	Potential trail is a portion of a trail which would circle the upper area of Marys Peak.
Nestucca River (Tillamook County)	11	Potential trail would provide access along the southern side of the Nestucca River on BLM-administered lands.
North Fork Alsea River (Benton County)	9	Potential trail would extend from a potential Parker Creek Recreation Site down Parker Creek and the North Fork Alsea River.
South Fork Alsea River (Benton County)	5	Potential trail system around the existing Alsea Falls Recreation Site and extending to Eugene District's Upper Lake Creek Special Recreation Management Area.
Tillamook Off-Highway Vehicle (Tillamook County)	29	Potential addition to existing motorcycle trail system.

Sources: Western Oregon Digital Data Base and Salem District recreation inventory records.

Table 3-38 1993 Recreation Visits to BLM-Administered Lands in the Salem District

Recreation Use Category	Recreation Visits	Percent of Total Visitation
Off-highway travel	118,200	5
Motorized travel	677,500	28
Nonmotorized travel	389,900	16
Camping	236,100	10
Hunting	91,000	4
Other land-based use (e.g., sightseeing, picnicking, nature study, photography, collecting)	532,400	22
Fishing	150,600	6
Boating	39,100	2
Other water-based use (e.g., swimming, general water play, tubing)	109,600	5
Winter sports	39,400	2
Snowmobiling	3,600	less than 1
Total	2,387,400	100

Source: Recreation Management Information System Data Base.

There are no known significant conflicts among various recreation user groups on BLM-administered lands in the district. Recreation use at any given time and location is relatively light. It is anticipated that the capacity of existing extensive recreation management areas and potential special recreation management areas to handle foreseeable recreation use should not be exceeded for many decades.

Use of developed recreation sites is at or near design capacity during weekend days throughout July and August. Recreation site visitation on mid-week days during this period often approaches 80 percent of design capacity at the district's high-investment sites such as Fishermen's Bend and Wildwood. Mid-week visitation at the other recreation sites during July-August varies from 15 to 30 percent of design capacity. Use of existing recreation sites is expected to reach design capacity throughout July-August on weekend and mid-week days in the early 2000s. For the balance of the year when the sites are open to public visitation, use is expected to range between 50 and 60 percent of design capacity.

Timber Resources

The composition of BLM's present forest landscape reflects the influence of a long history of natural disturbances and human activity. Of the 398,100 acres of BLM-administered lands within the Salem District, almost 95 percent is classified as forest land. This land supports a mosaic of forest stands, from young plantations to mature timber to old growth. The majority of stands other than old growth are relatively even-aged, and became established following wildfire or logging. During the last 30 to 40 years, most BLM program activities in the planning area have been closely related to management and harvest of this valuable timber resource.

Douglas-fir is the predominant tree species within the planning area, comprising more than 80 percent of the standing timber volume. Other important conifer species include western hemlock, western redcedar, noble fir, Pacific silver fir, and Sitka spruce. Red alder and bigleaf maple are the principal hardwood species.

Forest stands in the planning area are generally vigorous and productive, due to abundant moisture and mild temperatures. There are few serious threats to their health and longevity, other than wildfire or windstorms. However, they are locally affected by several types of diseases and tree-damaging insects. Forest health issues are discussed in more detail in the Biological Diversity and Ecological Health section.

Timber management direction for the Salem District was based on the management framework plans and records of decision approved in 1983. These plans established decadal targets for the volume of timber to be harvested and the acreage of various silvicultural treatments to be applied. However, a court injunction which became effective in January 1992, prevented further sales of timber from BLM-administered lands except for a limited amount of commercial thinning and salvage.

Practices used to establish and tend forest plantations are collectively termed forest development. Table 3-39 shows average annual planned levels of timber harvest and forest development treatments for the district from 1984 through 1992, and the corresponding levels actually funded and accomplished during the first nine years. The types of forest development activities listed in the table are explained below.

Inventory

The Timber Production Capability Classification System was developed and applied to BLM's western Oregon lands during the mid-1970s, as BLM managers became aware that some sites were not suited to timber management. Under the Timber Production Capability Classification system, all BLM-administered lands are inventoried to determine their ability to support repeated cycles of establishment, growth, and harvest of forest trees, without loss of site productivity. Factors considered during Timber Production Capability Classification mapping included land uses, soil characteristics, rock content, slope steepness, slope stability, available moisture, and drainage.

The Timber Production Capability Classification is a dynamic system. Classifications and boundaries are adjusted when better information becomes available or when BLM acquires or disposes of tracts of land. Timber production capability was completely reinventoried in 1986-1987 by teams of soil scientists and foresters.

The first classification delineated in the Timber Production Capability Classification is nonforest land. Second, areas that are considered too fragile to tolerate harvest operations or that could not be reforested within a reasonable time are classified as unsuitable woodland. These sites are very wet, unstable, excessively steep, or rocky, and are excluded from the planned harvest of timber.

Finally, the areas considered capable of supporting growth and harvest of trees on a sustained basis are classified as restricted or nonproblem. On restricted sites, special practices are needed to prevent damage to site productivity or to ensure successful reforestation. Nonproblem sites support repeated cycles of harvest and growth of forest stands, using standard harvest and reforestation practices, without damage to long-term productivity. Figure 2-2 illustrates how sites are defined and classified under the Timber Production Capability Classification system. Table 3-40 displays the results of the Timber Production Capability Classification inventory as of January 1, 1993.

BLM-administered forest lands are inventoried approximately every ten years to estimate current timber volumes, growth rates, and mortality. This periodic forest inventory is based on the measurement of more than 700 permanent five-point sample plots. The inventory is a stratified random sample of

Table 3-39 Timber Management and Forest Development

Practice	Average Annual Planned for 10 Years (1984-1993)	Average Annual Funded and Accomplished in Nine Years (1984-1992)
Harvest Level		
Million Cubic Feet	38	29.36
Million Board Feet	245	191.28
Harvest Methods (acres)		
Clearcutting	3,610	2,912
Commercial Thinning	520	41
Mortality Salvage	130	113
Shelterwood	90	37
Selective Cut	0	81
Site Preparation (acres)		
Broadcast Burning	2,960	2,504
Herbicide	700	0
Other	0	630
Planting (acres) - includes all species		
Regular Stock	2,650	3,576
Genetic Stock	2,460	114
Plantation Maintenance and Release (acres)	3,160	2,484
Brush and Hardwood Conversion (acres)	140	60
Animal Damage Protection (acres)	1,450	1,255
Precommercial Thinning (acres)	1,230	1,020
Fertilization (acres)	1,160	1,012

Source: U.S. Department of the Interior, BLM, OSO 1983, 1983c, 1984-92.

the commercial forest in each of the district's four sustained-yield units. Table 3-41 compares acres and volume of conifer timber stands, by ten-year age class, for the current and the previous inventory. Table 3-42 displays the same information for hardwood stands. The 1980 data reflects inventory plot measurements conducted in 1978-1979 and the 1990 data is derived from remeasurements in 1987-1988. The acreage and volumes for 1993 were derived by adjusting the 1990 figures for subsequent growth and harvest.

According to Sessions (1990), BLM administers about ten percent of the total forest land within the three timbersheds of northwest Oregon. Of the total standing timber volume in this area in 1989, about 9.3 percent was located on BLM-administered lands. Table 3-43 displays forest acres and estimated timber volumes for the major groups of land ownership within the North Coast, Willamette, and Eugene

Timbersheds, as of 1989. The BLM data in the table includes the Salem District and much of the Eugene District.

Harvest

BLM uses timber inventory information along with land allocations, proposed management practices, and future growth predictions to determine a sustainable annual timber harvest level for those lands available for timber production. This harvest level, or probable sale quantity, is recalculated for each planning cycle, or approximately every ten years. This process is described in more detail in appendix BB.

Timber sale volumes declined during this period for several reasons. First, the district's available forest land area declined by about ten percent because of

Table 3-40 Timber Production Capability Classification, January 1993

Classification	Acres
Nonforest	
Rockland	3,200
Brush	200
Grass	400
Water	1,000
Highway	15,100
Utility	500
Agriculture	700
Subtotal	21,100
Nonsuitable Woodland	
Fragile Nonsuitable	36,000
Suitable Woodland	
Low Site	0
Nonsuitable Commercial Forest Land (Reforestation Problem)	12,000
Subtotal	12,000
Suitable Commercial Forest Land	
Nonproblem	44,600
Fragile Suitable	63,200
Reforestation Problem	131,600
Combination Reforestation and Fragile Problem	83,800
Subtotal	323,200
Total Unclassified Acres (Table Rock Wilderness)	5,800
Total Acres	398,100

Source: Mini-Micro*Storms data base.

several land transfers and exchanges. This lowered the target sale level to 239 million board feet. Then in 1989 and 1990, some planned timber sales were withheld to avoid adverse impacts to northern spotted owls or their habitat. Sale volume was about 210 million board feet for each of those years. Since the 1992 injunction, the annual acreage of timber harvest has fallen rapidly, as timber purchasers complete harvest of timber purchased prior to the court's order.

Annual reports compiled by the Oregon Department of Forestry show that average timber harvest from BLM lands over the last ten years amounts to almost ten percent of total harvest from the thirteen counties within the Salem District planning area. Table 3-44 compares harvest volume among the different ownerships. The BLM volumes in the table include all harvest from Salem District and most of the harvest from Eugene District.

During the past decade, clearcutting was the predominant method of timber harvest on BLM-administered lands in the planning area. A small part of total harvest volume was removed by shelterwood harvests; commercial thinnings, and salvage of scattered dead or dying trees.

The acreage commercially thinned for timber production during this period was less than ten percent of the target. This shortfall occurred primarily because fewer stands were found suitable for thinning during on-the-ground examination than were predicted in plan development.

Silvicultural Practices

Following logging, harvested areas are commonly covered by varying amounts of logging debris (limbs, tops, cull logs) and competing vegetation. Site preparation treatments are used, where necessary, to reduce the amount of debris and brush on the area. This lessens the fire hazard, provides room for tree seedlings to be planted, reduces habitat for rodents which eat tree seedlings, and reduces early competition from other vegetation. Generally, 400 to 700 tree seedlings are planted per acre. When genetically-improved stock is planted, those seedlings have been grown from seed of parent trees selected for improved growth and form, under BLM's Tree Improvement Program.

Nursery-grown seedlings are planted on all harvested units as soon as possible after logging and site preparation are completed, usually the following winter. Very little genetically improved stock has

Table 3-41 Comparison of Salem District Inventory of Conifer Stands

Age Class	Acres			Cubic Foot Volume (thousands)			Board Foot Volume (thousands)		
	1980	1990	1993	1980	1990	1993	1980	1990	1993
0	19,822	9,234	7,115	0	0	0	0	0	0
1-5	19,802	13,783	14,850	0	0	0	0	0	0
10	30,757	32,719	29,443	0	388	5,803	0	0	0
20	22,935	29,280	31,762	0	18,213	34,412	0	91,778	175,688
30	42,202	26,671	34,668	119,955	53,788	88,300	722,551	282,927	469,657
40	30,754	35,739	35,341	119,759	158,115	177,177	733,657	862,701	976,163
50	13,789	24,166	25,246	67,675	165,580	186,847	421,525	932,890	1,061,650
60	8,819	20,968	20,097	50,829	172,183	174,248	318,037	997,552	1,016,577
70	13,144	9,957	10,089	86,652	78,656	83,505	546,371	466,323	498,483
80	16,079	7,900	7,891	124,878	77,215	79,786	785,372	468,298	485,913
90	27,117	8,653	8,493	233,661	80,307	81,444	1,481,402	493,834	504,088
100	25,255	18,573	18,205	226,873	225,512	225,729	1,433,870	1,416,857	1,412,475
110	7,945	14,284	14,084	74,433	158,883	160,246	475,040	984,757	997,337
120	9,614	7,775	7,677	99,780	91,532	92,172	643,071	575,183	580,731
130	8,353	6,476	6,522	93,160	70,058	71,705	598,984	444,109	455,600
140	2,996	1,777	2,005	30,135	22,935	26,181	192,775	146,509	167,339
150	1,889	2,482	2,648	22,414	32,428	34,965	145,703	207,539	223,368
160	0	346	311	0	4,445	4,037	0	28,275	25,783
170	519	129	137	7,585	2,022	2,161	50,061	13,035	13,931
180	0	0	0	0	0	0	0	0	0
190	1,732	0	0	26,374	0	0	172,894	0	0
200+	27,383	26,302	25,986	352,305	329,066	325,113	2,258,927	2,122,405	2,096,909
Totals	330,906	297,214	302,570	1,736,468	1,741,327	1,853,831	10,980,240	10,534,974	11,161,692

The 1993 acres shown conform to the acreage relationships listed below. They are actual inventory acres and have not been rounded off as in other tables. Acre adjustments are due to timber sales sold, map and forest type updating, and several land exchanges. The 1993 volumes are estimated using 1990 inventory volumes, BLM predicted "normal" yield tables, and "approach to normality" assumptions.

1993	
302,570	Total conifer inventory acres
30,599	Hardwood stands
34,509	Fragile nonsuitable sites
0	Miscellaneous management withdrawals (e.g., high use recreation sites)
5,799	Table Rock Wilderness
24,599	Nonforest lands
398,076	Total district acres

Source: Salem District inventory data base.

Table 3-42 Comparison of Salem District Inventory of Hardwood Stands

Age Class	Acres			Cubic Foot Volume (thousands)			Board Foot Volume (thousands)		
	1980	1990	1993	1980	1990	1993	1980	1990	1993
0	0	696	0	0	0	0	0	0	0
1-5	0	0	0	0	0	0	0	0	0
10	2,875	140	60	0	14	32	0	54	123
20	2,006	1,488	1,051	566	2,293	1,819	2,926	11,855	9,404
30	4,985	2,875	3,233	5,490	6,246	8,308	33,379	37,976	50,513
40	6,133	4,615	4,644	12,074	16,133	18,237	80,051	106,962	120,911
50	1,732	6,598	6,612	22,203	32,551	30,990	153,645	225,253	214,451
60	2,248	4,090	4,245	17,553	16,822	17,854	123,047	117,922	125,157
70	3,630	3,156	3,137	14,170	13,959	14,112	98,907	97,434	98,502
80	5,240	3,579	3,308	14,939	16,732	15,704	104,274	116,789	109,614
90	630	3,262	3,415	19,305	16,036	16,863	134,749	111,931	117,704
100	25,255	18,573	18,205	2,625	2,804	2,807	18,323	19,572	19,593
110	0	100	98	0	492	490	0	3,434	3,420
120	0	130	130	0	675	676	0	4,712	4,718
130	0	13	14	0	68	74	0	475	517
140	0	29	29	0	159	160	0	1,110	1,117
150+	0	59	58	0	333	229	0	2,324	1,598
Totals	30,801	31,392	30,599	108,925	125,317	128,355	749,301	857,803	877,342

The 1993 acres shown conform to the acreage relationships listed below table 3-41. They are actual inventory acres and have not been rounded off as in other tables. Acre adjustments are due to timber sales sold, map and forest type updating, and several land exchanges. The 1993 volumes are estimated using 1990 inventory volumes with growth projected for a three-year period using measured volume relationships.

Source: Salem District inventory data base.

Table 3-43 Forest Area and Growing Stock by Owner and Timbershed (1989)

Owner	Forest Land ¹ (thousands of acres)	Volume ² (million cubic feet)
North Coast Timbershed		
Public		
National Forest	301	1,222
Bureau of Land Management	219	730
State and other	519	1,579
Private		
Forest Industry	1,266	4,054
Nonindustrial	500	1,842
Total	2,805	9,427
Willamette Timbershed		
Public		
National Forest	1,260	3,743
Bureau of Land Management	160	564
State and other	96	393
Private		
Forest Industry	571	1,340
Nonindustrial	365	1,212
Total	2,452	7,252
Eugene Timbershed³		
Public		
National Forest	1,265	3,682
Bureau of Land Management	378	906
State and other	17	77
Private		
Forest Industry	568	1,600
Nonindustrial	220	580
Total	2,348	6,845

¹ Area includes the total of available and nonavailable forest land.

² National forest growing stock data are based on 9-inch diameter at breast height (dbh) to a 6-inch top for natural stands and 7-inch dbh to a 4-inch top for managed stands. BLM and state data are based on 7-inch dbh to a 4-inch top for all stands. Private data are based on 5-inch dbh to a 4-inch top for all stands.

³ Includes acres and volumes for Eugene and Salem BLM districts.

Source: Sessions 1990.

been planted to date. This is because most test plantations in the planning area were established during the 1980s, and test results were not available in time to provide improved seed during the period of the current plan.

Each young stand is regularly monitored for survival and growth. Stand maintenance and release treatments are prescribed as needed to manage competing vegetation. Manual cutting, generally with chain saws, is the most common method used.

Occasionally, plantations are overtaken by brush or hardwoods which crowd out most of the conifer seedlings. When existing vegetation is cleared from such areas to prepare for a new plantation of conifers, the practice is termed conversion.

Where seedling damage by browsing or clipping animals occurs or is expected, measures are taken to protect the seedlings in those areas. The most common practices are placement of plastic mesh tubes and trapping.

Precommercial thinning is used to control the spacing of stands 10 to 20 years of age. Precommercial thinning promotes better growth rates on individual trees, provides an opportunity to remove damaged or diseased trees, and permits selection of a desired species mixture in the stand.

Nitrogen fertilizer is aerially applied to selected young stands to promote increased growth, increasing the volume and value per acre of the timber.

Table 3-44 Volume Harvested in Counties Within the Salem District Planning Area 1983-1992¹ (thousands of board feet, Scribner 32-foot log scale)

Year	Forest Industry	Other Private	State	BLM	Forest Service	Indian	Other Public	Total
1983	1,552,625	138,734	204,980	298,917	1,099,146	5,719	3,948	3,304,069
1984	1,542,930	174,112	214,446	335,592	1,283,808	13,069	20,141	3,584,098
1985	1,537,867	199,789	184,506	354,866	1,381,282	14,795	10,252	3,683,357
1986	1,640,066	249,520	147,571	392,341	1,464,235	3,984	14,769	3,912,486
1987	1,550,854	267,358	134,327	410,212	1,331,613	12,551	20,772	3,727,695
1988	1,523,679	351,704	204,779	500,075	1,423,872	24,491	16,838	4,045,437
1989	1,542,514	369,642	138,225	367,609	1,077,829	30,500	9,965	3,535,284
1990	1,408,805	314,549	81,498	257,900	523,706	23,705	17,862	2,628,025
1991	1,480,879	272,726	72,208	199,883	619,207	21,276	13,862	2,680,041
1992	1,500,837	355,878	108,811	197,275	395,501	30,970	12,192	2,601,464
Average	1,528,106	269,401	149,135	331,467	1,060,020	18,106	14,060	3,370,295
Percent of Total	45.3	8.0	4.4	9.8	31.5	0.6	0.4	100.0

¹ Includes all timber harvested from the following counties: Benton, Clackamas, Clatsop, Columbia, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington, and Yamhill.

Source: Oregon Department of Forestry 1983-1992.

Energy and Mineral Resources

The Salem District administers the mineral estate for 390,000 acres of BLM land and 27,800 acres of split estate. Private companies hold the mineral rights on approximately 8,100 acres of BLM-administered land. Combinations of energy and mineral commodities in the planning area vary by physiographic region. In the Coast Range Region, natural gas has been extracted from the Cowlitz beds near Mist, Oregon (Niem and Niem 1985). Other commodities known to occur in the region are uranium, manganese, coal, gold, mercury, limestone, sandstone, siltstone, sand and gravel and rock for road construction. In the Willamette Valley Region, mineral commodities include limestone, siltstone, and limonite deposits near Scappoose and Lake Oswego; bauxite (ore of aluminum) in Washington and Columbia counties; sand and gravel; and basalt as a rock source. Mineral commodities such as gold, silver, mercury, copper, lead, clay, and zeolites occur in the western Cascades region. Approximately 90 percent of the known deposits are on private land.

Since 1980, very little mineral activity has occurred on BLM-administered lands in the planning area. Exploration for locatable minerals such as gold and silver, has been minimal, with no notices or plans of operation filed in the last ten years. As of November 1992, there were 50 mining claims. Leasable mineral exploration consisted of one permit to drill for oil and gas and ten notices of intent to conduct geophysical work for oil and gas. No notices of intent for geothermal exploration were received. As of March 1993, one 80-acre oil and gas lease was in effect. Salable mineral activity was mainly rock production from BLM quarries and pits. Annual production is 130,000 cubic yards from 95 sources.

There is potential for occurrence of locatable and leasable minerals on BLM-administered lands in the planning area. Mineral potential, as used in this document, refers to the potential for occurrence, not development, of a mineral. Determinations of potential are based on known occurrences, the geological environment, inferences, and exploration activity. Table 3-45 summarizes mineral potential for locatable, salable, and leasable minerals. Maps 3-10 and 3-11 display the areas of potential. There are no known geothermal resource areas or areas of critical mineral potential in the planning area.

Table 3-45 Mineral Potential in the Planning Area

Mineral Type	Mineral Potential (acres)			
	Unknown/ Low ¹	Moderate ²	High ³	Total
Locatable	321,900	18,000	58,200	398,100
Salable	392,100	5,000	1,000	398,100
Leasable				
Oil and Gas	153,000	219,700	25,400	398,100
Geothermal	393,600	4,500	0	398,100
Coal	386,400	11,200	500	398,100

¹ Unknown/Low Potential. References and district documents indicate geologic formations and processes are not favorable for the accumulation of mineral resources or there is insufficient information to make a determination of the mineral potential.

² Medium Potential. References and district documents indicate geologic formation and processes are favorable for the accumulation of mineral resources. For example there may be additional mineral resources in old mines and prospects or new resources in areas with a high level of mining notice filing.

³ High Potential. References and district documents indicate geologic formation and processes are favorable for the accumulation of mineral resources. These are areas with known active mines or active exploration and development activities, indicating high potential for the accumulation of mineral resources.

Source: Salem District mineral inventory files.

Socioeconomic Conditions

For purposes of socioeconomic description, the Salem District is equated to all counties in table 1-1 except Lane County. Socioeconomic contributions from Salem District lands in Lane County are included in the Eugene District analysis. Information regarding population, employment and personal income has been examined at the county level to determine the basic structure and scope of the economy in the region. A 1984-1988 baseline has been selected to represent average economic conditions in the region. The selected baseline encompasses a period of national recovery and growth that followed the recession of the early 1980s. Additional information regarding recent trends has been included when available to provide a context for pending decisions. In most cases, a summary for each county or metropolitan area has been provided. Detailed information has not been displayed.

The planning area encompasses urban and rural areas. Many rural areas of the state were slow to show economic growth after the early 1980s recession. This is one indicator of the limited economic diversity that still exists. The Portland and Salem metropolitan areas and other urban areas generally led the state in the post-recession recovery.

Population

During the baseline period, the population in the twelve counties averaged 1,692,706, with 37.3 percent of those persons living in unincorporated areas. Statewide, 40.8 percent of the population lives in unincorporated areas (Portland State University 1991-1993). Table 3-46 displays the 1984-1988 average population, 1980 and 1990 census populations and migration for the decade by age group for the state and all counties in the district. Population estimates for 1992, the most recent year available, are also included. Since the 1980 census, the twelve counties have shown varying population trends. In general, counties with larger initial populations grew faster than those counties with smaller initial populations. This general trend is expected to continue. Estimates of net migration do not include the natural rate of population change (births minus deaths). Only persons moving to and from specific counties are counted. As the table indicates, Benton, Linn, and Tillamook counties attracted additional older residents despite overall migration from these counties. Development of these counties as retirement com-

munities will likely change the types of goods and services demanded. This may bring new businesses to these areas.

Employment

The urban areas in the planning area offer diverse types of employment. In the rural areas, employment has been traditionally dependent upon natural resources production and use. Timber, fisheries, agriculture, and tourism provide significant employment.

The three largest employment sectors in the planning area during the baseline period were trade (183,568), services (163,872), and manufacturing (130,232) (Oregon Employment Division 1984-1990). The wood products sector deserves particular attention. It is significantly influenced by BLM timber management programs. Major mill operators which use BLM timber include Avison Timber Company, Boise Cascade Corporation, Estacada Lumber Company, Hampton Tree Farms, Inc., Willamette Industries, Inc., and Young and Morgan Lumber Company. Employment in this sector is sensitive to raw material supply and overall economic health. A link is often drawn between housing starts and business cycles and the health of the wood products industry (see Timber Supply section in chapter 4 for additional information). Since 1989, employment in the wood products industry decreased significantly. Between July 1988 and September 1991, the Oregon Employment Division recorded 28 mill cutbacks or closures in the planning area affecting 2,404 jobs (Oregon Employment Division 1991). These jobs represent 8.9 percent of 1984-1988 average wood products employment in the region. The 1992 lumber and wood products employment (includes paper) in the twelve county region totalled 24,200. This is a 12.8 percent decrease from the 1988 level of 27,780.

Employment in the wholesale and retail trade industries and in the service sectors increased during the baseline period. Government employment (federal, state and local governments, and public education) also increased during the baseline period. Recently, employment growth regionally and nationally in all sectors has slowed.

Table 3-47 displays unemployment rates for all counties during the baseline period and for 1989 through 1992. As shown, unemployment rates generally declined throughout the baseline period to the present. However, unemployment rates in Benton, Clatsop, and Columbia counties have increased slightly since 1988. In general, the less

populous counties have higher unemployment rates. They are the first to experience increased unemployment during economic downturns and are the slowest to recover during economic upswings.

Personal Income

Personal income information is an indicator of wealth in a particular area. Income statistics track wage and nonwage income sources. Nonwage income sources include transfer payments, interest, dividends and rent. In counties where many are retired, this is important. Retirees derive income from a variety of sources other than wages. Table 3-48 displays average per capita personal income for the state and the counties in the district for the baseline period. Per capita personal income for 1989, 1990, and 1991 is also displayed. In general, counties with higher populations have higher per capita personal income.

BLM Economic Contribution

BLM-administered lands in western Oregon have historically made significant contributions to local economies. Timber harvested from these lands supplies local mills. Fish reared in stream reaches managed by BLM contribute to commercial and sport fisheries. Nonresident visitors using BLM-administered lands and facilities for recreation bring new dollars into local communities. Counties receive payments from BLM in accordance with a variety of current laws. For planning purposes, an input-output model (BLMPACT) was developed to help estimate economic impacts of BLM management on local economies. Models were developed to represent each BLM district and western Oregon (U.S. Department of the Interior, BLM, OSO 1989b).

Timber

The Salem District manages 398,100 acres of land, most of which was allocated in 1983 for timber production (U.S. Department of the Interior, BLM, SDO 1983 and 1983c). The average annual harvest from this land during 1984-1988 totaled 237 million board feet (U.S. Department of the Interior, BLM, OSO various years), or approximately nine percent of all harvest from all ownerships in the region. Harvest from Forest Service lands was 30 percent of all harvests, and private industrial harvests were 45 percent of the total. The remaining 16 percent was harvested from state, other public, Indian and nonindustrial private lands (Oregon Department of Forestry various years). Input-output analysis (U.S.

Department of the Interior, BLM, OSO 1989c) estimates that the average annual harvest from BLM-administered lands during the baseline period contributed 1,350 jobs to the timber industry and \$36,960,000 in direct local personal income. Respending added 1,170 jobs in other sectors and \$18,480,000 in local personal income.

BLM timber sales were halted by court injunction in 1991. Through fiscal year 1993, harvest of BLM sales previously sold and remaining under contract have continued to provide jobs and income in the region. As of October 1, 1993, little timber remains under harvest contract and no significant harvests are expected on BLM-administered lands for the duration of the injunction.

Recreation

Economic impacts occur when visitors from outside the planning area make purchases in local communities. These new dollars create jobs and enhance personal income. During an average year in the baseline period, an estimated 132,500 nonresidents visited BLM-administered lands in the planning area. Among nonresident visitors were 2,700 hunters, 7,200 fishermen and 122,600 participants in nonconsumptive activities such as camping and picnicking. Nonresident visitation is estimated to be increasing by three percent per year according to visitation projections.

Input-output analysis (U.S. Department of the Interior, BLM, OSO 1989c) estimates that spending by these visitors generated 70 direct jobs and \$830,000 in direct local personal income. Respending effects added 50 jobs and \$730,000 in local personal income.

Fisheries

The Salem District manages 229 miles of stream suitable for spawning and rearing of anadromous fish species. Most of the fish spawned and reared in BLM-managed streams are caught offshore or on waters reached through other ownerships. The value of the fisheries resource provided by the BLM can be measured by jobs and personal income generated by the commercial fishing industry and by local expenditures of sport fishermen. Due to the mobility of anadromous fish, the economic benefits of fish spawned and reared in a specific location may accrue to regions outside the spawning region.

Table 3-46 Population Trend Summary

County	1984-1988 Average Population	1980 Census	1990 Estimated	Net Migration	1980-1990 Migration 0-64 Years	1980-1990 Migration 65+ Years	1992 Estimated
Benton	69,000	68,211	70,811	-2,215	-2,299	84	72,900
Clackamas	252,000	241,911	278,850	21,205	18,791	2,414	294,500
Clatsop	33,160	32,489	33,301	-370	-353	-17	33,100
Columbia	36,260	35,646	37,557	-134	123	-257	38,800
Lincoln	37,566	35,264	38,889	2,964	2,431	533	39,600
Linn	88,150	89,495	91,227	-4,411	-5,776	1,365	95,000
Marion	213,290	204,692	228,483	8,820	3,675	5,145	241,500
Multnomah	564,560	562,647	583,887	-11,783	-5,922	-5,861	605,000
Polk	45,600	45,203	49,541	1,759	1,414	345	53,000
Tillamook	21,440	21,164	21,570	-72	-340	268	22,500
Washington	273,700	245,860	311,554	38,943	35,990	2,953	340,000
Yamhill	57,980	55,332	65,551	5,745	4,680	1,065	69,200
District Total	1,692,706	1,637,914	1,811,221	60,451	52,414	8,037	1,905,100
State of Oregon	2,685,660	2,633,156	2,842,321	36,217	10,006	26,211	2,979,000

Source: Portland State University 1991-1993.

Table 3-47 Unemployment Rates in Counties and Metropolitan Statistical Areas (MSA)

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Benton	5.7	5.4	5.1	3.7	3.6	3.5	3.8	3.6	4.4
Clatsop	11.0	8.3	8.6	6.6	5.8	6.4	6.4	6.6	7.9
Columbia	8.9	9.5	10.6	8.2	7.3	7.3	7.4	7.8	11.2
Lincoln	10.2	10.2	8.3	6.6	6.2	6.0	5.9	5.8	7.3
Linn	13.0	12.8	12.1	8.3	7.9	7.5	8.1	8.6	10.3
Portland MSA ¹	7.9	7.4	7.2	5.3	4.8	4.5	4.2	4.7	6.4
Salem MSA ²	8.9	8.2	8.5	6.2	5.9	5.9	5.4	5.6	6.9
Tillamook	12.6	10.9	9.0	8.2	7.1	6.8	6.1	6.3	7.4
State of Oregon	9.4	8.8	8.5	6.2	5.8	5.7	3.5	6.0	7.5

¹ Portland Metropolitan Statistical Area includes Clackamas, Multnomah, Washington, and Yamhill counties.² Salem Metropolitan Statistical Area includes Polk and Marion counties.

Source: Oregon Employment Division 1984-1990.

Prior to 1989, an estimated 103,000 pounds of chinook and coho salmon or one percent of Oregon's total annual commercial catch of these species was attributed to BLM-managed streams in the planning area. An estimated 24,000 sport fishing visits (inland and offshore) was attributed to BLM-managed streams. These estimates were developed independently of recreational fishing estimates discussed previously.

Input-output analysis (U.S. Department of the Interior, BLM, OSO 1989c) estimates statewide employment of 16 direct jobs and \$170,000 of direct personal income was dependent upon the BLM-managed fisheries resource in the planning area. Western Oregon responding effects added 10 jobs and \$200,000 in personal income. Since 1988, the commercial catch has declined, and the sport fishing catch has been erratic (Oregon Department of Fish and Wildlife 1991 and Pacific Fishery Management Council 1992). Fishery-related employment and personal income have been adversely affected, especially by the downturn in commercial catch.

Special Forest Products

The BLM provides use of special forest products to the public consistent with other land uses and resource allocations. Free use collection of a limited amount of mushrooms, huckleberries, elderberries and some other products offers a unique and rewarding recreational opportunity for many individuals. Traditional, ceremonial, and subsistence uses may also be met through free use collection.

Negotiated and advertised sales also provide significant receipts and contribute to local employment. In 1989, floral greenery sales within the Pacific Northwest were estimated to generate 128 million dollars within the regional economy and employ 10,000 people (Schlosser et al. 1992).

Tables 3-18 and 3-19 (see Vegetation, Special Forest Products) identify types of forest resources collected in the Salem District and the quantity collected for those items documented through permitting or sale. In western Oregon the BLM collections associated with the sale of special forest products totalled \$2,355,000 between fiscal year 1987 and fiscal year 1991.

Table 3-48 Personal Income (dollars/capita)

	1984	1985	1986	1987	1988	Baseline Average	1989	1990	1991
Benton	11,883	12,500	13,211	13,796	14,561	13,190	15,716	16,401	16,783
Clackamas	14,192	15,013	15,569	16,475	17,439	15,738	18,724	19,782	20,215
Clatsop	11,739	12,884	13,784	14,059	14,991	13,491	16,331	16,563	16,816
Columbia	11,214	11,719	12,245	12,807	13,496	12,296	14,498	15,311	15,742
Lincoln	11,572	12,381	13,559	13,736	14,147	13,079	15,184	15,851	16,446
Linn	10,133	10,768	11,248	11,915	12,659	11,345	13,537	14,126	14,638
Marion	11,293	11,957	12,518	13,143	13,923	12,567	14,967	15,932	16,509
Multnomah	13,822	14,512	15,017	15,584	16,667	15,120	18,160	19,045	19,627
Polk	10,833	11,754	12,183	12,652	13,152	12,115	13,939	14,719	15,089
Tillamook	10,368	11,268	11,666	12,057	12,721	11,616	13,366	14,122	14,533
Washington	14,791	15,387	16,009	16,720	17,557	16,093	18,876	19,968	20,391
Yamhill	11,036	11,393	12,175	12,724	13,499	12,165	14,583	14,985	15,468
State of Oregon	12,309	12,934	13,541	14,180	15,024	13,598	16,193	17,038	17,495

Source: U.S. Department of Commerce 1993.

BLM Payments to County and State Governments

State and local governments receive monies from timber harvest activities in the planning area. This is compensation for taxes lost due to public management of these lands. These payments affect local government services and employment.

Fifty percent of the revenue generated by timber sales on Oregon and California (O&C) lands is distributed to western Oregon counties. The amount is determined by a formula based on the 1915 assessed value of the Oregon and California lands within each county. Average annual O&C payments to the counties during the baseline period (1984-1988) and annual payments from 1989 through 1993 are displayed in table 3-49. The O&C payments go directly into the county general fund and can be spent without restriction. In some counties this is a substantial portion of the general fund.

Recently annual legislation has provided additional safety net payments to the counties. These payments guarantee revenue at levels slightly less than receipts in past years. These safety net payments have mitigated a large portion of the county revenue impacts of reduced BLM harvest under the recent court injunctions.

BLM payments to Oregon and California counties are not made on a per capita basis. However, displaying them as payments per capita allows useful comparisons between counties and indicates the levels of dependence on BLM payments (see table 3-50).

The counties also receive payments in lieu of taxes (PILT) from the BLM for a variety of federally managed lands not O&C. Table 3-51 displays PILT payments. Along with some BLM public domain lands, compensation is paid for national forests, national parks, federal water projects, U.S. Army Corps of Engineers dredge disposal areas, some

Table 3-49 BLM O&C Payments Made to Counties (dollars/year)

County	Average 1984-1988 O&C Payment	1989	1990	1991	1992	1993
Benton	1,769,803	3,065,703	5,724,284	1,941,415	3,330,082	2,208,280
Clackamas	3,477,507	6,042,285	11,305,971	3,834,466	6,577,209	4,361,549
Clatsop	0	0	0	0	0	0
Columbia	1,301,733	2,228,657	4,196,450	1,423,243	2,441,2701	1,618,881
Lincoln	233,964	391,932	733,360	248,722	426,630	282,911
Linn	1,669,253	2,902,990	5,377,975	1,823,963	3,128,618	2,074,683
Marion	918,862	1,590,479	2,974,183	1,008,707	1,730,221	1,147,362
Multnomah	684,730	1,186,683	2,220,452	753,075	1,291,740	856,592
Polk	1,359,256	2,351,592	4,400,162	1,492,333	2,559,779	1,697,468
Tillamook	355,409	620,409	1,140,783	386,901	663,646	440,084
Washington	415,918	691,267	1,283,380	435,264	746,603	495,095
Yamhill	460,400	809,693	1,466,721	497,444	853,260	565,823
District Total	12,646,834	21,881,690	40,823,721	13,845,533	23,749,058	15,748,728

Note: A 26.9 million dollar safety net payment was made in fiscal year 1992 to supplement fiscal year 1991 payment to a level equal to 90 percent of the 1988-1990 average payment.

Source: U.S. Department of the Interior, BLM, OSO various years.

Table 3-50 Per Capita BLM O&C Payments Made to Counties, 1984-1988 Average

County	O&C Payment (dollars)	Population	Payment Per Capita (dollars)
Benton	1,769,803	69,000	25.65
Clackamas	3,477,507	252,000	13.80
Clatsop	0	33,160	0.00
Columbia	1,301,733	36,260	35.90
Lincoln	233,964	37,566	6.23
Linn	1,669,253	88,150	18.94
Marion	918,862	213,290	4.31
Multnomah	684,730	564,560	1.21
Polk	1,359,256	45,600	29.81
Tillamook	355,409	21,440	16.58
Washington	415,918	273,700	1.52
Yamhill	460,400	57,980	7.94
Total	12,646,835	1,692,706	7.47 (average)

Sources: U.S. Department of the Interior, BLM, OSO various years; Portland State University 1991-1993.

national wildlife refuges and military installations. These annual payments of 75 cents per acre are subject to a per capita ceiling. They are reduced to a minimum of 10 cents per acre when other revenue sharing activities make equivalent payments. In western Oregon, each county receives the minimum payment.

County dependence on BLM and Forest Service timber revenue was assessed by Lee et al. (1991). Benton, Columbia, Linn, and Polk were the only counties in the district examined in the report. A comparison of the budgets of these counties and federal timber revenues is shown in table 3-52.

The impacts of the Ballot Measure 5 property tax limitation are independent of federal taxation, spending, revenue sharing or land management. However, it is an important economic condition that is influencing county funding in western Oregon. In general, urbanized counties in western Oregon have reduced tax rates to comply with the law. Most rural counties are at or approaching the maximum permitted tax rates. Thus it is generally accepted that western Oregon counties will be unable to generate additional

or substitute revenue through property tax rate increases if revenue from federal and other sources declines.

As a legacy of the United States General Land Office, the BLM manages former homestead lands. Approximately five percent of the revenues generated from public domain lands throughout Oregon is paid to the state. During the baseline period, the average annual payment to the state was \$329,905 (U.S. Department of the Interior, BLM, OSO various years). The fiscal year 1992 payment to the state was \$895,332. The state distributed these monies to the counties for building roads and bridges.

The state of Oregon collects a forest products harvest tax from the purchasers of BLM timber on every thousand board feet of timber harvested in the state. Forest research, the activities of the Oregon Forest Practices Act, and emergency fire control are funded by this tax. Table 3-53 displays the tax rates during the baseline period and to the present biennium.

Community Stability

The previous sections described economic indicators and trends for the counties in the planning area mostly from 1984-1988. In the years following this period, population, employment, and personal income have generally increased in the urban areas of Salem, Portland and surrounding communities. However, population, employment, and personal income have generally decreased in rural areas.

Three factors have contributed to these changes in rural areas. The first is the national recession during 1991-1992 which was felt locally. The second is the decline in federal timber harvest levels. BLM harvest declined from an average annual sale quantity of 237 million board feet (1984-1988) to 204 million board feet in 1989, 214 million board feet in 1990, 124 million board feet in 1991, and 1.6 million board feet in 1992 (U.S. Department of the Interior, BLM, OSO various years). A similar trend occurred on the Willamette, Mt. Hood, and Siuslaw national forests which are partially in the planning area.

The third factor is the ongoing structural change in the timber industry. Examples of these changes include decreasing labor intensity, increasing use of smaller diameter logs, increased competition and specialization, expansion of international markets for wood products, increased use of substitute building materials, expanded use of wafer board, and increased production and use of laminates and engi-

Table 3-51 BLM Payments in Lieu of Taxes (PILT) Made to Counties (dollars/year)

County	Average 1984-1988 PILT Payment	1989	1990	1991	1992	1993
Benton	1,969	2,032	2,084	2,086	2,086	2,086
Clackamas	50,124	51,470	51,470	51,485	51,423	51,839
Clatsop	308	315	315	315	315	315
Columbia	0	0	0	0	0	0
Lincoln	17,818	18,344	18,340	18,340	18,346	18,346
Linn	46,942	48,344	48,332	48,332	48,357	48,353
Marion	19,992	20,478	20,478	20,478	20,470	20,470
Multnomah	6,947	7,185	7,227	7,237	7,432	7,458
Polk	0	0	0	0	0	0
Tillamook	10,256	9,399	9,398	9,398	9,409	9,308
Washington	283	291	291	291	291	291
Yamhill	2,604	2,564	2,564	2,587	2,587	2,587
District Total	157,243	160,410	160,499	160,549	160,716	161,053

Source: U.S. Department of the Interior, BLM, OSO various years.

Table 3-52 Federal Timber Revenues and County Budgets, 1990

County	O&C Revenues (dollars)	Unrestricted Total General Fund (dollars)	Percent O&C	Total Budget (dollars)	Percent O&C	BLM and Forest Service Timber Revenue as Percent of Total Budget
Benton	2,769,090	11,851,835	23.4	31,074,122	8.9	10.5
Columbia	1,846,873	7,453,847	24.8	14,749,389	12.5	15.3
Linn	2,769,441	11,845,732	23.4	56,312,890	4.9	25.3
Polk	2,160,000	7,522,860	28.7	20,778,567	10.4	10.4

Source: Lee et al. 1991.

Table 3-53 Forest Products Harvest Tax (FPHT) Rates Applicable to BLM Timber Purchasers (dollars/thousand board feet, Scribner long log)

Period	Forest Practices Act	Forest Research Lab	Emergency Fire Fund	Forest Resources Institute	Industrial Fire Prevention	Total FPHT Rate
7/1/83-6/30/85	0.12	0.23	0.15	0.00	0.00	0.50
7/1/85-6/30/86	0.10	0.21	0.00	0.00	0.00	0.31
7/1/86-6/30/89	0.10	0.21	0.15	0.00	0.00	0.46
7/1/89-6/30/91	0.16	0.21	0.30	0.00	0.00	0.67
7/1/91-6/30/93	0.39	0.30	0.50	0.31	0.14	0.64
7/1/93-12/31/94	0.56	0.40	0.66	0.31	0.21	2.14

Sources: Schaak 1991.

needed wood products. In rural areas the social impacts associated with these three factors include unemployment, loss of income, and increased needs for social services (Lee et al. 1991). These identified impacts may indicate what could be expected if BLM land management decisions cause long-term reductions in timber supply or recreation opportunities.

Some communities rely heavily upon timber harvest and processing as a source of economic activity. Communities in rural areas typically have only one or two large manufacturing employers, usually timber related. Employment options in these communities are severely limited. Options may be further limited in communities located some distance from the major trade centers of Salem and Portland.

The Oregon Economic Development Department has prepared a report on communities severely affected by recent trends in the timber industry (Oregon Economic Development Department 1993). A community is considered severely affected if it meets one of two criteria:

- The community has experienced a four percent or more decline in timber industry employment since 1989 compared to the total 1990 workforce in the community.
- The community demonstrates it has suffered or is likely to suffer severe economic decline, and the Oregon Economic Development Department director declares it severely affected.

The report identifies the following severely affected communities in the planning area: Astoria, Beaver Creek, Blodgett, Brownsville, Cascadia, Clatskanie, Crabtree, Estacada, Foster, Garibaldi, Gates, Idanha, Jefferson, Lebanon, Lyons, Marion, Mill City, Molalla, Monmouth, Philomath, St. Helens, Sweet Home, Tidewater, Vernonia, Warrenton, and Willamina. These communities are eligible for assistance through the Oregon Timber Response Program. This program provides dollars to train displaced workers, fund public works projects, and fund loans for businesses.

An Oregon State University Extension Service publication (Seldel 1993) examined these and other communities within Oregon. Using census data for 1980 and 1990, the report found that these timber-dependent communities lagged behind non-timber-dependent communities. On average, they experienced no population growth, declining median household income, higher unemployment and poverty rates, and lower educational attainment.

Additional communities in the planning area with a high degree of timber dependence are Dallas, Grande Ronde, Sheridan, and Silverton (Oregon Legislature, Joint Legislative Committee on Land Use 1991). In these communities, higher paying jobs, community resources, basic reasons for existence of the industry (e.g., close to raw material supplies), and culture (e.g., desire for independence and outdoor lifestyle) are closely tied to the timber industry.

Local Resources

Population and employment opportunities in the Salem District are concentrated in urban areas. These areas provide important benefits to the economies of rural areas. The benefits include secondary services such as transportation, business, and finance, which cannot be fully provided by rural economies; markets for rural products, especially lumber and recreation opportunities; and employment opportunities for workers who lose their jobs in rural areas within commuting distance of the urban centers.

However, urban areas cannot provide all the economic needs of rural communities. Many rural residents want to remain where they live. They are making the necessary efforts to enhance the economies of their communities. The communities of Sweet Home and Mill City have been working with the Oregon Economic Development Department through the Community Initiatives Program. They are identifying specific actions to enhance economic activity and diversity in their areas (Mill City Economic Development Committee 1991 and Pacific Power Economic Development Department 1991). One specific BLM management action, a trail from Fishermen's Bend Recreation Site, has been identified in the two economic development plans. The district will work with the two communities to meet the objectives of the plans.

Another program which involves the BLM is the Oregon Economic Development Department Regional Strategies Program (Oregon Economic Development Department 1988). In counties with tourism strategies, the district is planning additional recreation development and/or management on the upper Nestucca, Salmon, and Sandy rivers to attract more tourists. The district is also working with the North Santiam, Linn County, and Polk County tourism coalitions to determine how the BLM could manage recreation resources to enhance tourism.

Rural Interface Areas

County governments have planned and zoned some private forest lands intermingled with BLM-administered lands as rural residential, farm/forest or similar titles. In rural residential zones, minimum allowable lot sizes range from one to five acres. In the farm/forest zones, minimum allowable lot sizes range from 10 to 20 acres. Single family dwellings are allowed outright in the one to five-acre zones and with conditions in the 10 to 20-acre zones. Depending upon the quality of forest resources and levels of existing development in the 10 to 20-acre zones, zoning ordinances may:

- restrict nonresource uses (e.g., no homes unless necessary for management of forest resources);
- allow nonresource uses with conditions (e.g., a home placed so it does not interfere with adjacent resource uses); and
- allow a mixture of resource and nonresource uses.

These provisions are intended to reduce the possibility of conflicts between residential uses and forest resource management activities.

In some situations within the district, residential uses of forest lands and intensive forest management activities near homes have created concerns. Due to adverse effects on both interests, these concerns

need to be addressed in BLM land use planning. To accomplish this, the areas where rural residential and/or farm/forest zoning occur near BLM-administered lands have been mapped (see map 3-12). For the purpose of the resource management plan, these areas are referred to as rural interface areas.

Rural interface areas include areas of private and BLM-administered lands within one-half mile of the interface line. The one-half mile distance was selected as a probable zone of influence. The analysis of impacts in chapter 4 will also examine a one-quarter mile zone of influence within the rural interface areas. Although problems have occurred where lots are larger than 20 acres, these larger lot areas will not be analyzed due to limited inventory data. The amount of BLM-administered lands within rural interface areas is summarized in table 3-54.

Rural interface areas are found throughout the lower elevations of the district. Most of them are near population centers, along state highways, and in narrow valleys which extend into the Coast and Cascade ranges. Many of the private lands in rural interface areas are highly desirable for residential use. This use is a concern to BLM for three major reasons:

- homes and lot sizes impede efficient management of BLM-administered forest lands;

Table 3-54 BLM Acres in Rural Interface Areas

County	Within 1/4-mile of 1 to 5-acre Zoned Areas	Within 1/4-mile of 1 to 20-acre Zoned Areas	Within 1/2-mile of 1 to 20-acre Zoned Areas
Benton	117	4,345	8,790
Clackamas	1,081	4,715	8,266
Columbia	215	250	467
Lincoln	131	151	383
Linn	4	2,784	4,954
Marion	733	908	2,218
Multnomah	150	604	1,126
Polk	0	0	0
Tillamook	898	1,134	3,340
Washington	72	379	754
Yamhill	18	2,371	4,297
Total	3,419	17,641	34,617

Source: Western Oregon Digital Data Base.

- some rural interface area property owners, especially residents, object to forest management activities on adjacent lands and take actions to stop or change the activity; and
- the cost of wildfire suppression is greatly increased when dwellings are present.

BLM's rural neighbors generally accept adjacent or nearby forest management activities with few complaints. However, the district has experienced problems including:

- a house too close to a property line to allow safe and efficient timber harvest and reforestation operations;
- a resident taking domestic water from a stream which would be temporarily affected by road building or other forest management operations;
- a resident objecting to a large clearcut on a steep slope within immediate view of the home;
- a possible health and safety problem due to proposed slash burning in a nearby area; and
- denial of access across private property.

When neighbors' concerns are expressed early in project planning, they are given full consideration in developing design features and mitigation measures. When concerns are expressed late in project planning, they cause costly delays in implementation of some projects. Instead of starting a project as scheduled, unplanned work time is required to reanalyze projects, respond to more than the usual number of letters and phone calls, and arrange and/or attend more than the usual number of meetings with individuals and the public. With the increasing trend in rural residential development, costly project delays caused by the expressed concerns of neighbors could significantly increase in the future.

Fire/Fuels Management

The proposed resource management plan incorporates by reference the analysis of fire in appendix B of the SEIS.

Fire, and other agents of disturbance (e.g., wind, insects, and diseases) have greatly influenced the development of Pacific Northwest forests. Fine-scale disturbances, generally by insects or diseases, cause deaths of single trees or small groups of trees which result in small patches of early-successional vegetation embedded in a larger portion of older forest.

Coarse-scale disturbances, such as fire and wind, result in more extensive areas of early-seral vegetation. Many native forest organisms have adapted to these cycles and scales of disturbance and regrowth. Forest ecosystems are dynamic, changing with or without active management.

Fire is the major natural agent of disturbance within the planning area. The distributions, abundance, and dominance of the major plant communities are strongly affected by the frequency, intensity, and extent of wildfire events. Fire has both direct and indirect effects on the forest environment. These effects vary depending on individual forest stand and plant community conditions and composition, as well as fire intensity. Most of the current late-successional and old-growth stands developed from natural regeneration following wildfire events that occurred during the last 200 to 600 years. Some of these fires covered large areas--frequently many thousands of acres. Although these fires were large, they burned in patches of variable intensity and severity, and left many areas of unburned or lightly burned forest. The natural regime of patchy fires that leave an abundance of large dead trees and lesser amounts of scattered live trees, as individuals and in patches, is the basis for silvicultural methods such as retention of green trees as individuals and in patches. Throughout the planning area, natural disturbance patterns have a long history and were sometimes catastrophic. In other areas, disturbances were frequent and of low magnitude, maintaining open forest stands.

The long-term frequency, intensity, and extent of fire events (known as the fire regime) depend largely on climate and weather patterns. Fire characteristics also depend upon the available fuel which is related to past forest management practices, including the use of prescribed fire and the effectiveness of wildfire suppression (i.e., wildfire exclusion). Smoke emissions from wildfires are also dependent upon stand history and weather conditions.

Interruption of natural fire regimes has a direct effect on ecosystem species composition, and sometimes on species persistence. The near exclusion of natural, low-to-moderate intensity wildfires has resulted in a proliferation of fire-intolerant and shade-tolerant species. Changes in long-term soil productivity, stand structure and function, forest health, and biological diversity are also occurring due to the exclusion of fire. The mortality potential of trees due to insects and disease makes forests more susceptible to high-intensity, stand-replacing fires.

Many natural disturbances do not result in complete mortality of stands. For example, recent fires in the western Oregon Cascade Range killed 25 to 50 percent of trees within the areas burned, leaving 50 to 75 percent of the stands intact. The surviving trees are important elements of the new stand. They provide structural diversity and a potential source of additional large snags during the development of new stands. Furthermore, trees injured by disturbance may develop cavities, deformed crowns, and limbs that are habitat components for a variety of wildlife species.

Large fires and relatively long fire-return intervals in moist portions of some river basins resulted in periods during which landscapes contained large areas of relatively unbroken forest cover. In the warmer, drier landscapes, fire is more frequent, less intense, and is an integral part of the internal dynamics of a typical stand (tens to hundreds of acres).

Natural disturbance is an important process within late-successional forest ecosystems, but humans have altered disturbance regimes. Fire suppression has resulted in significant increases in accumulated fuels within some forests, particularly in the eastern Cascade Range and in southwestern Oregon. At the same time, these forests may have become much more vulnerable to insects and diseases. Due to fire suppression, some forests have become quite dense and multistoried, primarily from the invasion of shade-tolerant species. Total protection might have been a viable short-term strategy in 1910, but it is not viable in the 1990s.

At a landscape scale and over long periods, stand-replacing wildfires have an important role in initiating successional processes and developing new areas of late-successional forests to replace those lost through succession or disturbance. Most plant communities in the planning area are adapted to fire, although at the natural recurrence of fire is at widely varying intervals. Some species require periodic fire for their persistence, and many additional species are well adapted to periodic burning. Fire can also be used effectively in the restoration and maintenance of wildlife habitat. Some plant species require canopy gaps that may have been historically maintained by fire. Fire reduces understory competition, increases light, provides nitrogen, and stimulates germination of some fire-adapted species. The role of fire in the life history of some species warrants further investigation because fire is necessary for the persistence of some species. Underburning may improve habitat for some fire-adapted species. Site-specific treatments are more appropriate than broader scale treatments because some species with limited

distributions are fire intolerant. Without resuming underburning, biological diversity would be diminished by the loss of many native plant species and some plant communities.

The combination and interaction of fire frequency, intensity, and extent that occur in an ecosystem are known as a fire regime. Natural fire regimes vary widely between and across landscapes of the planning area. However, some generalizations can be made to characterize the role of fire in natural ecosystem processes. These descriptions are based on knowledge of pre-European settlement fire regimes derived from historical accounts, early forest management inventories, and various imprints of fire on forest stands (e.g., stand ages and other tree ring data). Natural fire regimes are briefly characterized below.

The fire regimes of Pacific Northwest forests span a wide gradient of variation. Natural fire regimes ranged from infrequent (hundreds of years) stand replacement fires, to very frequent (several years) low-intensity surface fires that had little effect on the canopy trees. Although fire regimes can be described on the basis of characters of the disturbance itself, or character of the vegetation, another way is by defining the fire regime on the basis of fire effects, or severity. The system using fire severity is defined in terms of fire effects on dominant tree species, and works well for application to habitat.

A high severity fire is one that topkills most of the vegetation in the stand (70 to 80 percent plus of the basal area); a moderate severity fire topkills 20 to 70 percent; and a low severity fire topkills less than 20 percent of the basal area. Fire, in a silvicultural sense, tends to thin from below, first taking smaller trees and/or those less fire-resistant (thin-barked, for example). Each regime is defined on the basis of the modal severity but fires of other severity levels are likely to occur as well. The most complex fire regimes are the moderate ones because of the mix of expected fire severities, while the low and high fire severity regimes are generally more predictable. Management activities over decades, such as successful fire protection, can change low or moderate severity fire regimes to moderate to high severity fire regimes.

In the moist Douglas-fir forests of the Coast Range of Oregon, fire return intervals are long. Much larger than average events may have occurred in the past as a result of short-term but extreme changes in climate. In the moist climates, natural fire return intervals are quite long, often over 500 years. However, even in the moist climates, fire has been an

important ecosystem process in particular microclimates (e.g., on long, dry southwest-oriented slopes). Patterns of reburns on the Tillamook fire of 1933 at six-year intervals (1939, 1945, 1951), and at the southern Washington Yacolt burn of 1902 are evidence these landscapes will reburn. High surface fire potential during early succession in Douglas-fir forest was identified by Isaac (1940) as a vicious cycle of positive feedback, encouraging rhizomatous bracken fern (*Pteridium aquilinum*). Given sufficient sources for rekindling (e.g., the original Yacolt and Tillamook burns and all reburns are thought to have been human-ignited), the reburn hypothesis is likely to be true in certain areas. However, it is not clear whether reburns were a common event prior to European settlement in the moist portion of the Douglas-fir region. After crown closure, potential surface fire behavior declines, and then gradually increases in the old-growth seral stage.

For many years, the pattern of stand replacement fire was a paradigm of fire for west side Douglas-fir forests. Recent work, particularly in the Oregon Cascade Range in drier western hemlock plant associations, suggests a higher fire frequency and different ecological role for fire in mesic to dry Douglas-fir forest. Some authors suggest a natural fire rotation of 95 to 145 years during the last five centuries. The patchiness of at least some of the fires is illustrated by fire severity maps. A similar fire regime has been noted on dry Douglas-fir sites in the western Oregon Cascade Range. Using conservative methods that did not recognize underburns with no resulting regeneration or substantial fire-scarring of trees, One author estimated a natural fire rotation of 100 years during the last five centuries. If fires of moderate severity are removed from the analysis, a stand-replacement mean fire return interval is 130 to 150 years, suggesting that intense fires are a significant part of the natural fire regime in this area, but that fires of lower severity also occur. Other stands of 500 years age or older exist without much evidence of recurrent fire.

Before the advent of fire suppression, fire frequencies in Cascade Mountains of the Salem District were moderate due to the incidence of lightning, which was supplemented by the use of fire by American Indians. Fire severity under current forest and climatic conditions is high. The Coast Range, however, experienced infrequent but very large fires, especially in the 1800s and 1900s. As a result, many of the remaining natural forests consist of a mosaic of mature stands and remnant patches of old-growth trees.

The recent historic fire history of the planning area is shown in table 3-55.

One objective of ecosystem analysis and management is to identify disturbance regimes and to manage the landscape within that context. The role of fire management in the maintenance of ecosystems within the planning area is well recognized. Fire management activities consist of wildfire suppression, wildfire hazard reduction, and prescribed fire applications. Fire is used or suppressed in the context of achieving ecosystem management objectives at the landscape level.

Table 3-55 Distribution of Fires by Size Class, 1984 to 1993

Size Class (acres)	Number of Fires	Number of Acres
1 (0.00 to 0.25)	54	7
2 (0.26 to 9.99)	31	96
3 (10.0 to 99.99)	13	348
4 (100.0 to 299.99)	0	0
5 (300.0 to 999.99)	1	— ¹
6 (greater than 1000.0)	0	0

¹ Rock House Creek Fire, 5,001 acres, 376 BLM.

Source: Salem District wildfire records.

Chapter 4

Environmental Consequences



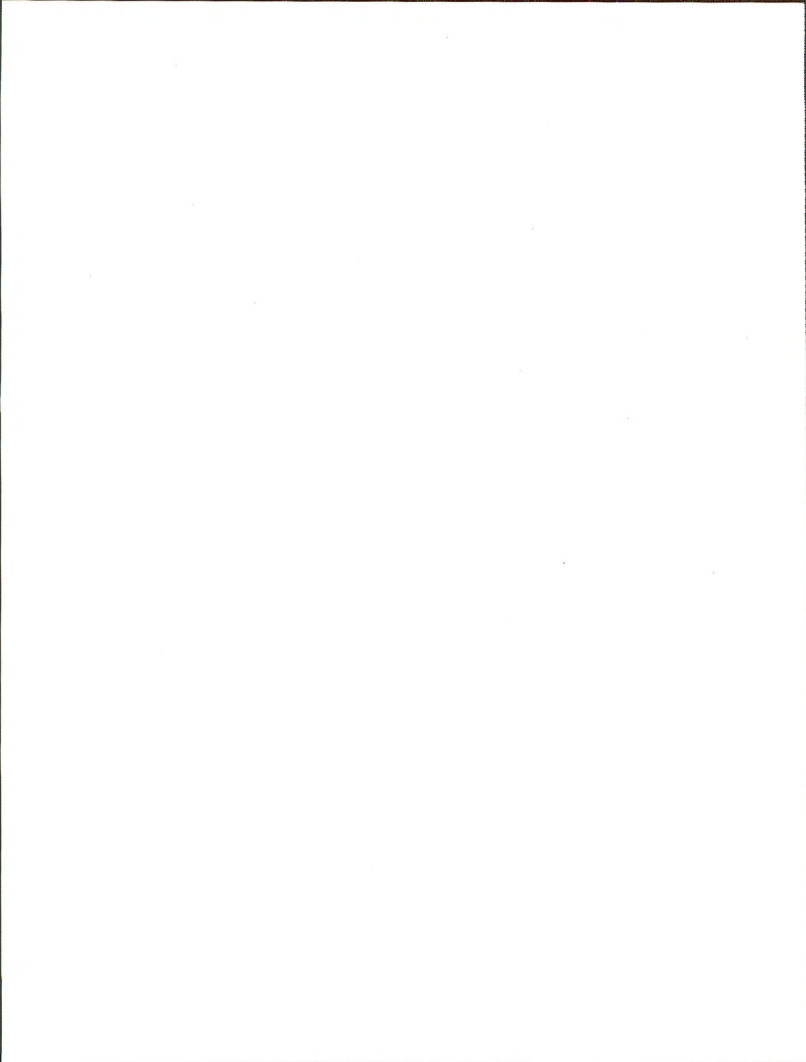


Table of Contents

Chapter 4

Environmental Consequences

Major Changes from Chapter 4 of the Draft Resource Management Plan	4-1
Introduction	4-2
Incomplete or Unavailable Information	4-5
Mitigation	4-6
Effects on Global Climate	4-7
Effects on Air Quality	4-8
Effects on Soils	4-11
Effects on Water Resources	4-14
Effects on Biological Diversity and Ecological Health	4-19
Effects on Vegetation Including Special Forest Products	4-26
Effects on Riparian Zones	4-28
Effects on Wildlife Habitat	4-29
Effects on Fish Habitat	4-39
Effects on Special Status and SEIS Special Attention Species and Habitat	4-41
Effects on Special Areas	4-60
Effects on Cultural Resources Including American Indian Values	4-62
Effects on Visual Resources	4-62
Effects on Wild and Scenic Rivers	4-64
Effects on Recreation	4-67
Effects on Timber Resources	4-70
Effects on Energy and Mineral Resources	4-80
Effects on Socioeconomic Conditions	4-83
Effects on Rural Interface Areas	4-93
Effects on Wildfire	4-94
Consistency with Other Agency Plans and Programs	4-96



Major Changes from Chapter 4 of the Draft Resource Management Plan

General

- The land base has increased by 4,500 acres due to exchanges. Where acres are presented by alternative, the increase is shown only under the proposed resource management plan.
- The consequences of the proposed resource management plan have been added, and, except for data in table S-2, those of the previous preferred alternative have been dropped.
- Wherever appropriate, statements referencing and summarizing the analysis of effects in the SEIS have been added.

Air Quality

- This section has been rewritten to incorporate relevant discussions in the SEIS.

Water Resources

- The Watershed Condition Index analysis has been dropped. The watershed analysis in the SEIS is incorporated by reference.

Biological Diversity and Ecological Health

- A description of impacts to ecological health has been added.

Vegetation

- A description of impacts to special forest products has been added.

Fish Habitat

- The long-term condition analysis has been dropped in favor of the analysis in the SEIS.

Wildlife

- A discussion of impacts to neotropical migrant birds has been added.

Special Status and SEIS Special Attention Species and Habitat

- The SEIS analysis of species closely associated with late-successional forests has been incorporated. They are referred to as SEIS special attention species.
- The discussion was revised to include an assessment of effects on individual species rather than collectively as in the draft resource management plan.
- The analysis of 50-11-40 dispersal habitat criteria for the northern spotted owl has been dropped.
- The McKelvey spotted owl population model has been dropped in favor of the SEIS analysis.
- Discussions of critical habitat for spotted owls and proposed critical habitat for marbled murrelets have been added.

Recreation

- A statement has been added explaining recreation demand analyses in the SEIS and the proposed resource management plan.

Timber Resources

- The discussion of factors affecting forest health has been expanded.
- The timber supply analysis has been updated.
- Sensitivity analyses have been modified.
- The probable timber sale quantity (formerly allowable sale quantity) is discussed in this section.

Fire/Fuels Management

- A separate section discussing this topic has been added.

Socioeconomic Conditions

- Alternatives no action and A through E have been reanalyzed within the context of changed Forest Service management direction specified in the SEIS record of decision. In order to estimate what future actions are likely to occur on Forest Service lands and in order to enhance the discussion of cumulative impacts, the analysis has drawn heavily upon the analyses in the Final SEIS, and the decisions in the SEIS record of decision.

Introduction

In this chapter, the environmental consequences (impacts or effects) of implementing the alternatives described in chapter 2 are defined and compared to existing conditions described in chapter 3. This chapter is organized by resource element. Effects are described by alternative within each individual resource element as appropriate. A tabular comparison of consequences of the alternatives is shown in the resource management plan/environmental impact statement summary (see table S-2).

Preliminary analysis, including scoping, indicates the alternatives would not significantly affect the following: geology, topography, grazing, agriculture, prime and unique farmlands, flood plains, paleontological values, or renewable energy (i.e., wind, hydro, biomass) use. Therefore, these topics are not discussed in this document. No analysis of impacts on wilderness values is presented since those values have been addressed in the separate *Oregon Wilderness Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1990b).

Valid existing rights (e.g., mining claims, rights-of-way, and leases) held by other government agencies, companies and individuals would continue under all alternatives. Development of claims and leases, construction of roads, etc. would have beneficial and adverse effects on the environment. The level of adverse effects would depend on the location of the action in relation to sensitive resources. There is no reasonable way to predict or quantify these potential actions. With a few exceptions, they will be addressed through predevelopment analyses.

Direct, indirect, and cumulative effects are considered, to the extent identifiable, in each analysis. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action. They occur later in time or are farther removed in distance, but still are reasonably foreseeable. Cumulative effects are those resulting from the combined activities on BLM-administered lands and on other public and private lands.

There are three topics that the National Environmental Policy Act requires environmental impact statements to address in relationship to the proposed action, which environmental impact statements often treat as separate topics:

- Relationship between short-term uses and long-term productivity;

- Irreversible or irretrievable commitments of resources; and
- Adverse environmental effects which cannot be avoided.

These topics are addressed, where relevant, as part of the discussion of environmental consequences for each component of the environment.

The baseline period to which predicted future effects are compared is normally 1984-1988. This is the period for which the existing plan was in effect at the start of environmental impact statement preparation and for which a wide range of relevant baseline data have been gathered and/or published.

Both short and long-term time frames were considered. Short-term is the period of time during which the plan will be implemented, assumed to be at least ten years. Short-term impacts include those resulting from harvest of timber sold during the ten-year period, even though such a harvest may occur two or three years after sale. Long term is the period beyond ten years. Whenever meaningful analysis depended on specificity provided by the ten-year timber management scenario, or for some cumulative effects that are primarily dependent on forecasting activities on private lands (e.g., effects on elk), long-term impacts were not analyzed in detail.

Analytical models have been used to assess some effects of the alternatives. These models, like all models of complex biological-physical or economic systems necessarily simplify reality. They also are limited by current knowledge, but represent a synthesis of the knowledge of BLM staff and/or outside scientists familiar with the subjects of concern.

Model evaluation involves extensive validation through testing and comparison of predictions with actual outcomes. In that sense, most of the models used are too new to be validated. In fact, such validation of most of these models would take decades. Nonetheless, they provide the most useful available methods, other than analyst intuition, for comparing probable differences in outcomes from implementation of the various plan alternatives. Confidence in their numbers varies but, in all cases, they are more useful for comparison of the relative consequences of alternatives than for precise predictions.

The application of the models to alternative C and the proposed resource management plan are attended by lower levels of confidence than the analyses of other alternatives. This is partly due to the untested nature

of many of the prescriptions of these alternatives. The confidence level in all analyses of the effects of the proposed resource management plan is also lower because the results of watershed analyses and Adaptive Management Area planning may modify both the rate and location of timber harvests, as well as management prescriptions. Adaptive management, however, will assure that objectives are met.

In addition to analyses of the consequences of the seven land-use allocation alternatives fully analyzed, BLM has conducted some sensitivity analyses of the effects of varying management approaches. Sensitivity analysis is a process of identifying opportunity costs associated with differing approaches to sensitive land-use allocations and other decisions. It can assist selection of a resource management plan by examining specific trade-offs that could result from making changes in single sensitive elements of an alternative.

Sensitivity analyses of some consequences of several alternatives were conducted during preparation of the draft resource management plan and summarized in appendix 4-A of that document. Additional sensitivity analysis of the following, as potential changes in the proposed resource management plan, have been made and are summarized in the Effects on Timber Resources section of this chapter.

- Excluding all critical spotted owl habitat from planned timber harvest.
- Foregoing some or all proposed intensive timber management practices (genetic tree selection, fertilization, and precommercial thinning/release).

The following assumptions were used as a basis for analysis of impacts:

- Sufficient funding and personnel would be available for implementation of the final decision. (If sufficient funding and personnel are not available, most environmental consequences would be less than predicted, but most effects on socioeconomic conditions would be greater.)
- The probable sale quantity and annual average silvicultural practices for the alternatives would be approximately as shown in table 4-1.
- The alternatives would be continued for many decades.
- Standard design features described in chapter 2 would be applied as described. They contain many of the mitigating measures that avoid, minimize, reduce, or eliminate potential environmental impacts.

- Local climate patterns of historic record (see appendix R for further discussion) and related conditions for plant growth will continue.
- During the expected ten-year life of the plan, 10 to 15 miles of new roads would be constructed by other parties across BLM-administered lands. Private parties would construct these roads under the terms of existing reciprocal right-of-way agreements.
- For analysis of cumulative effects, most private forest lands would be intensively managed with final harvest on commercial economic rotations occurring at 50 to 60-year intervals.

The probable sale quantity for the proposed resource management plan is an estimate of annual average timber sale volume likely to be achieved from lands allocated to planned, sustainable harvest. The use of probable sale quantity, rather than allowable sale quantity, recognizes uncertainties in the estimate. Harvest of this approximate volume of timber is considered sustainable over the long term. This is based on assumptions that the available land base remains fixed, and that funding is sufficient to make planned investments in timely reforestation, plantation maintenance, thinning, genetic selection, forest fertilization, timber sale planning, related forest resource protection, and monitoring.

The probable sale quantity represents neither a minimum level that must be met nor a maximum level that cannot be exceeded. It is an approximation because of the difficulty associated with predicting actual timber sale levels over the next decade, given the complex nature of many of the management actions/direction. It represents BLM's best assessment of the average amount of timber likely to be awarded annually in the planning area over the life of the plan, following a start-up period. The actual sustainable timber sale level attributable to the land use allocations and management direction of the proposed resource management plan may deviate by as much as 20 percent from the identified probable sale quantity. The potential variables are discussed in the Timber Resources section of this chapter. As inventory, watershed analysis and site-specific planning proceed in conformance with that management direction, the knowledge gained will permit refinement of the allowable sale quantity to be declared when a plan decision is made. The separable component of the probable sale quantity attributable to lands in key watersheds carries a higher level of uncertainty, due to the greater constraints of Aquatic Conservation Strategy objectives and the requirement to prepare watershed analyses before activities can take place.

Table 4-1 Estimated First-Decade Annual Levels of Timber Management Activity by Alternative

	Alternatives						
	NA	A	B	C	D	E	PRMP
Probable Sale Quantity							
Million cubic feet	37.2	51.9	43.9	17.1	17.3	20.1	5.7
Million board feet	239.2	333.8	280.5	107.0	106.7	127.1	34.8
Miscellaneous Volume¹							
Million cubic feet	-	-	-	-	-	-	0.7
Million board feet	-	-	-	-	-	-	4.0
Silvicultural Activity (acres except as noted)							
Final or regeneration harvest	3,100	4,560	4,000	1,800	1,800	2,100	600
Commercial thinning/density management harvest	500	420	410	2,600	280	330	910
Road construction (miles)	11	16	12	18	9	8	5
Road construction	59	87	64	96	50	46	26
Ground-based yarding	70	120	90	100	180	100	40
Cable yarding, no suspension	340	460	440	230	190	240	60
Cable yarding, partial suspension	2,440	3,500	3,160	1,340	1,250	1,640	460
Cable yarding, full suspension	250	480	330	130	150	100	40
Site preparation:							
Prescribed fire	2,320	3,010	3,010	410	1,320	1,570	480
Other (mechanical or manual)	470	930	600	720	270	310	590
Brushfield/hardwood conversion	100	430	390	190	160	220	90
Planting - regular stock	1,370	2,920	2,330	920	110	510	480
Planting - genetically selected stock	2,050	2,100	2,100	920	1,820	1,780	450
Stand maintenance/protection:							
Vegetation control	1,860	2,730	2,400	790	1,060	1,250	1,840
Animal damage control	780	1,140	1,000	180	440	520	1,280
Precommercial thinning and release	2,790	4,100	3,610	1,190	1,590	1,880	2,970
Fertilization	3,810	4,150	3,870	3,140	0	2,160	600

¹ Includes estimated volume from thinning in Late-Successional Reserves.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Sources: Representative ten-year timber management scenarios, MicroStorms data base, and Trim-Plus Model.

During the first several years, the annual probable sale quantity will not likely be offered for sale. The proposed resource management plan represents a new forest management strategy. Time will be required to develop new timber sales that conform to the proposed resource management plan.

Average annual timber sale volumes from thinnings in young stands in Late-Successional Reserves are also estimated. These volumes too are unlikely to be offered for sale in the first few years of plan implementation.

A ten-year representative timber management scenario was developed based on the land use allocations for each alternative except the no action alternative and the proposed resource management plan, and used to assess potential short-term site-specific impacts. The scenarios represent the resource area staffs' assumptions as to possible locations of timber harvest units and road locations. A total harvest scenario (harvest units and roads) was built for the land that would be available for timber harvest in alternative A. This scenario was then adjusted to the land available for timber harvest.

For alternatives A through E, random spatial selection of timber harvest units was linked to the Trim-Plus allowable sale quantity calculation to determine the ten-year scenario that meets management selection criteria to provide the calculated probable sale quantity identified for the alternative. The selected scenarios were evaluated for practicality by resource area timber sale planners. Estimates of logging practices and average annual levels of associated activities and intensive management practices for the decade of the plan are displayed in table 4-1. In borderline cases, the estimates assume the practice which results in greatest impact.

For the proposed resource management plan, the tie to a set of representative harvest units was not performed. One reason is that the representative timber harvest units and roads assumed for alternative A would not be applicable to the proposed resource management plan because of its enlarged riparian reserve systems and other changes in the plan. A set of new ten-year representative harvest units could be developed to fit the proposed resource management plan, except that many of the intermittent streams are not currently mapped in the Geographic Information System. Without the full spatial representation of the riparian reserves, the resource area planners would not be able to evaluate the scenario for practicality.

Accordingly, for the proposed resource management plan, the acreage by age class and timber type scheduled for harvest in the first decade was randomly depleted in average harvest unit quantities from across the available land use allocations and inventory to estimate the effects of harvest.

Due to unforeseeable events and adjustments made in site-specific planning, actual timber sale and management plans would differ from the ten-year scenarios. The scenarios provide an analytical tool, however, to help provide more specificity to analysis of impacts of the alternatives. Actions, such as timber sales, implementing the planning decisions will be analyzed before implementation to determine if impacts addressed in the environmental impact statement might differ significantly from those predicted.

A ten-year scenario of expected mineral exploration and development activity has also been developed (see appendix DD).

Analysis of the alternatives is also based on their different levels of planned activities as shown in table 2-1.

This proposed resource management plan incorporates by reference the conclusions of the SEIS. Specifically incorporated are conclusions about alternative 9 of the SEIS, which is embedded in the proposed resource management plan.

Incomplete or Unavailable Information

There is less than complete knowledge about many of the relationships and conditions of wildlife species, forests, the economy, and communities. The ecology, inventory and management of large forests is a complex and developing discipline. The biology of the specific species prompts questions about population dynamics and habitat relationships. The interaction among resource supply, the economy and rural communities is also the subject of an inexact science.

There is a substantial amount of credible information about the topics of this environmental impact statement; the central relationships and basic data are well established. The best available information was used to evaluate the alternatives. When encountering a gap in information, the question implicit in the

Council on Environmental Quality regulations on incomplete or unavailable information was posed: Is this information "essential to a reasoned choice among alternatives"? (40 Code of Federal Regulations 1502.22(a)). While additional information would often add precision to estimates or better specify a relationship, the basic data and central relationships are sufficiently well established that any new information would be unlikely to reverse or nullify understood relationships. Though new information would be welcome, no missing information was considered to be essential to a reasoned choice among the alternatives as they are constituted.

Nonetheless, the precise relationships between the amount and quality of habitat and the future populations of species are far from certain; there is a certain level of risk inherent in the management of forest lands even to standards based on conservative application of those relationships. For example, if the relationship between habitat and population were significantly different from how it now seems, or if management standards were to be broadly misapplied, the population and long-term viability of affected species would be at greater risk than that generally estimated in this document.

All other things being equal, the lesser the information, the greater the risk attributable to incomplete knowledge. That relationship is an impetus for the monitoring and adaptive management that is part of the proposed resource management plan, in particular. Should there be new scientific information on change in habitat conditions not projected, there are provisions for changing management of the forest to reflect the new information and the management practices for which it calls. This adaptive management process, which is guided by monitoring, research, and interagency oversight, provides additional assurance of compensating for possible catastrophic changes.

Mitigation

Mitigation is important in the design of the alternatives and implementation of any alternative. From the Council on Environmental Quality regulations (40 Code of Federal Regulations 1508.20), mitigation includes:

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing the impact by limiting the degree of magnitude of the action and its implementation;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- compensating for the impact by replacing or providing substitute resources or environments.

Mitigating measures have been incorporated and evaluated in the design of alternatives, and throughout the discussion of environmental consequences in this chapter. For actions analyzed in this resource management plan/environmental impact statement, mitigating measures are addressed primarily through land allocations, management standards, and best management practices as described in chapter 2.

Some examples of such mitigating measures built into the design of alternatives and identified in chapter 2 include:

- selection of timber harvesting techniques and timing to minimize soil damage;
- design and timing of prescribed burns to minimize effects on soils, wildlife habitat and air quality;
- wildlife tree retention; and
- elk forage seeding.

Effects on Global Climate

A large body of scientific opinion anticipates noticeable global warming during the twenty-first century. There is substantial scientific uncertainty, however, about the rate of such warming. A report of the Intergovernmental Panel on Climate Change said temperature increases could be as low as one degree centigrade or as high as five degrees centigrade by the year 2100 (Schneider 1991).

The primary factors leading to the expectation of warming are substantial increases in atmospheric carbon dioxide, nitrous oxide, methane, chlorofluorocarbons, and other trace gases attributed to human activity. BLM's land management activities in the planning area would primarily affect the amount of carbon dioxide (see appendix R for analytical assumptions). Forecasts of global carbon dioxide increases suggest it may double from the year 1900 level sometime between the years 2030 and 2080 (Schneider 1989). The plan alternatives, however, would have only a slight effect on atmospheric carbon dioxide levels.

A key factor in assessing the impact of timber harvest and forest regrowth on the amount of carbon in the atmosphere is the amount of carbon stored within the trees of the forest. One analysis shows that forests managed on rotations of less than 100 years would store less than half the amount of carbon stored in old-growth stands (Harmon et al. 1990), leaving more carbon in the atmosphere. Analysis by Harmon et al. indicated about 42 percent of timber harvested in the northwestern United States enters long-term storage in products, while paper production largely results in the loss of carbon dioxide to the atmosphere. Commentors on the analysis by Harmon et al. have suggested that some factors relevant to assessing the impact of timber harvest levels in the Pacific Northwest on global climate were apparently not considered in this analysis. Thus it overstates the effect of timber harvest. These factors include:

- the slow decomposition of products entering landfills;
- possible emissions increases if fossil fuels are burned in lieu of wood or wood products; and
- emissions associated with substitution of alternative construction materials for wood or substitution of wood from forests outside the northwestern United States.

The calculations of Harmon et al. indicate that each million acres of old-growth forest harvested in the northwestern United States would add less than one-tenth of one percent to the total carbon currently in the atmosphere. The largest acreage of old growth (older than 200 years) anticipated for harvest over a ten-year period in any plan alternative is about 19,800 acres in alternative A, while the proposed resource management plan would harvest about 470 acres of old growth. Although they store less carbon in total, young, fast-growing trees absorb more carbon from the atmosphere than older trees. Fertilization, vegetation management, and planting genetically selected stock all enhance this effect.

In old-growth and mature stands, release and absorption of carbon dioxide tend to be in balance. But logging, especially clearcutting, increases the rate of decomposition of debris on the forest floor, releasing more carbon dioxide. In the absence of timber harvest, wildfires over time would have similar effects but of lesser magnitude. Not until a young stand reaches the stage of canopy closure does its carbon uptake offset that release (Alaback 1989).

One forest practice directly contributing carbon dioxide to the atmosphere is prescribed burning after timber harvest. In the absence of burning, however, the decay of the same wood over many years would contribute a similar amount of carbon dioxide. The largest amount of prescribed burning anticipated over ten years is 93,900 tons of biomass under alternative A (see Effects on Air Quality section in this chapter). Under the proposed resource management plan, approximately 28,700 tons of biomass would be burned. These levels of burning would contribute carbon dioxide to the atmosphere totaling 140,900 tons and 43,100 tons, respectively. (Burning a ton of biomass can create up to one and one-half tons of carbon dioxide as the released carbon combines with oxygen.)

In the long term, a managed forest would be in balance with its release and absorption of carbon dioxide, just as an unmanaged forest. However, given that half of newly injected carbon dioxide would remain in the atmosphere (Schneider 1989), a decade of harvest of some of the older forest and prescribed burning under the proposed resource management plan could add 0.0002 percent to the carbon in the world's atmosphere, an unavoidable adverse impact.

The cumulative effects of BLM activities under the proposed resource management plan and similar activities proposed or anticipated on other forest lands in western Oregon and Washington for the

expected ten-year life of the resource management plan, would add an estimated 100 million tons of carbon dioxide to the world's atmosphere. This would increase carbon dioxide by 0.01 percent. This includes:

- Approximately 60 million tons from old-growth timber harvest indicated by BLM proposed resource management plans for western Oregon and by the Forest Service under the SEIS record of decision; and
- Approximately 40 million tons from prescribed forest management burning by all landowners as controlled by the ceilings established in the Oregon and Washington smoke management plans. The effect on global climate would be slight. Total increases in atmospheric carbon dioxide from all worldwide sources, by comparison, are occurring at a rate of almost one-half percent annually (Trexler 1991).

Effects on Air Quality

Major sources of air pollutants associated with BLM resource management activities are smoke from prescribed burning, application of herbicides used to control unwanted vegetation, and dust from use of unsurfaced roads and road construction and maintenance. The effects associated with herbicide use can be found in the *Western Oregon Program - Management of Competing Vegetation Final Environmental Impact Statement* (U.S. Department of the Interior, BLM, OSO 1992) to which this resource management plan is tiered.

Dust from new road construction and maintenance of older unpaved roads normally settles within a short distance from the point of origin. It has a negligible effect away from the construction and maintenance sites. Dust associated with road use also has negligible effect away from unpaved roads. Localized effects from road dust would be felt by residents within the rural interface area for all alternatives. The major adverse effect would be local and during the summer months when dust is produced from both public and administrative use of unpaved roads.

Prescribed burning is the only resource management activity proposed under any alternative that could have a notable adverse effect on local air quality. The effect of smoke from prescribed burning would either reduce visibility within a project area or under adverse meteorological conditions could concentrate the smoke around the project site. Under all alternatives, prescribed burning would comply with the guidelines

established by the Oregon Smoke Management Plan and the Visibility Protection Plan. The focus of the effects by alternatives is on PM₁₀ (particulate matter smaller than 10 micrometers) because these emissions from prescribed fire are the criteria pollutants that could have the greatest impact on nonattainment areas and rural residents. In addition to wildland prescribed fire, typical sources of PM₁₀ include industrial processes, woodstoves, roads, agricultural practices, and wildfires.

Projected Emissions

Historically, annual slash treatment levels have varied between 70 and 80 percent of the total harvested acres. Major limitations have been air quality restrictions and prescribed fire prescription parameters. Estimates of the expected annual acreage of prescribed fire use were calculated for each of the alternatives (see figure 4-1). Broad assumptions regarding the ecological need for prescribed burning, the hazard reduction that might be necessary for risk management, and the amount of prescribed burning necessary for site preparation and other silvicultural treatments were made at this planning level. These estimates are very generalized because many assumptions about the level of prescribed fire use for each land allocation within the district cannot be validated until watershed analysis, Late-Successional Reserve assessments, and Adaptive Management Area plans are completed. Species mitigation measures (including habitat enhancement) within the Matrix may sometimes increase the use of prescribed fire on a site-specific basis, but are generally expected to reduce the use of fire. Thus, air quality analyses at more site-specific planning levels, such as the project level, are critical in determining the actual amount of prescribed fire that may be needed on the landscape.

The amount and type of prescribed burning projected under alternatives C, D, E, and the proposed resource management plan represents a shift in emphasis compared to historical uses of prescribed fire. In the past decade, the majority of prescribed burning has consisted of broadcast burning of logging slash for site preparation and management of competing vegetation. Some of this burning simultaneously contributed to fuels hazard reduction. These historical uses of prescribed fire are maintained and emphasized in alternatives no action, A, B, D and E. Use of broadcast burning to meet silvicultural objectives would be a part of all alternatives, while alternative C and the proposed resource management plan use a combination of under-canopy and broadcast burning to meet the fuel treatment objectives.

In alternative C and the proposed resource management plan, prescribed burning emphasizes ecosystem processes restoration, habitat restoration and maintenance, and hazard reduction. In these alternatives much of the proposed burning would be underburning, in both natural and managed stands. Burning for hazard reduction and site preparation may frequently take place in stands with many more trees retained after harvest than in the recent past, necessitating changes in prescribed fire techniques. Burning piles of slash after harvest, or for hazard reduction, would be done during the most favorable emission dispersion conditions. This continues a recent trend in fuels management leading to further emission reductions as well as reduced impacts.

The shift in emphasis from broadcast burning to underburning has some inherent smoke management risks. Large areas may burn in mosaics with varying fire intensity and severity. While this mimics natural underburning, there are risks associated with retaining coarse woody debris; the likelihood for reburning may increase, as would the possibility for a prescribed burn to escape the planned burn area.

Consequently, the potential for additional, unanticipated emissions is also increased. Furthermore, costs associated with the need for rapid extinguishment of smoldering fuels may be high.

The majority of the prescribed fire use would be scheduled primarily during the period starting in March and ending approximately July 1. Some fire use after July 1 may occur on wet areas in the district. This treatment period minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content which reduces the amount of material actually burned. Broadcast and underburning would also be planned during the spring to reduce damage to the site from high intensity burning and to facilitate control of the units being burned.

By doing prescribed burning under advantageous weather conditions, subsequent wildfire emissions may be reduced due to a decreased amount of available fuel and a lowered risk of large-scale wildfire. The local impacts to residents in rural communities, nonattainment areas, and class I areas may

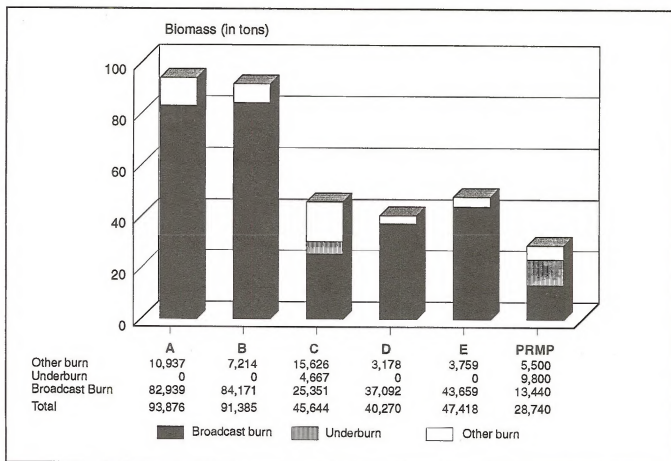


Figure 4-1 Biomass Consumption by Alternative

be reduced through the use of an active fuels management program that may include prescribed fire. Extensive wildfires frequently occur after periods of drought, thus fuel consumption may be very high. Wildfires may allow smoke to enter designated areas as well as nonattainment areas, while prescribed fires are specifically designed and conducted to minimize both their emissions and impacts.

This air quality analysis focuses primarily on fuel consumption and the impacts of particulate matter from burning for the following reasons:

- the large quantities emitted from fires;
- the potential contribution of PM₁₀ from prescribed fires and wildfires to concentrations above the PM₁₀ standard;
- the major reduction of visibility caused by PM₁₀; and
- the role PM₁₀ plays as a carrier of other toxic pollutants.

Consumption and Emissions by Alternative

Under all alternatives except A and B, smoke emissions from BLM burning would be less than the 1984-1988 average historic emission level. The 1976 to 1979 baseline is used to measure district progress towards the 50 percent reduction goal for total suspended solids emissions from forestry burning for all of western Oregon by the year 2000 (see chapter 3, Air Quality for further discussion).

Prescribed burning under alternatives no action, A, and B would have the greatest potential impact on air quality, with roughly 105 to 108 percent of the historic consumption levels respectively (1984-1988). Alternatives C, D and E would have lesser potential impacts on air quality, with projected consumption from prescribed burning of approximately 46 to 55 percent of historic levels. The proposed resource management plan would result in roughly 33 percent of historic consumption levels from prescribed fire use. For a description of the techniques used to estimate consumption and emissions for the proposed resource management plan, see the air quality analysis in the SEIS.

Oregon has an established emission reduction goals for total suspended particulate emissions from prescribed burning. The goal calls for a 50 percent reduction in these emissions by the year 2000. To obtain some indication of how future burning may impact emission reduction goals, the emissions

estimates for alternatives were compared the Oregon total suspended particulate baseline. Alternatives A and B would not comply with emission reduction goals. Emissions under alternatives C, D, E, and the proposed resource management plan would be below the baseline value for historic burning. Under the proposed resource management plan, fire use in the future would not compromise the ability of the state to reach prescribed burning emission reduction goals.

Prescribed burning under all alternatives is not expected to affect visibility within class I areas during the visibility protection period (July 1 to September 15). Prescribed burning would not be conducted in the planning area during this period unless it meets the special provisions of the Oregon Smoke Management Plan.

Prescribed burning emissions, under all alternatives, would not be expected to affect annual PM₁₀ attainment within nonattainment areas. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

The greatest potential for smoke intrusions into the nonattainment areas would come from underburning activities proposed under alternative C and the proposed resource management plan. Alternatives no action, A, and B would have less potential because most of the burning would be accomplished through broadcast burning, alternative treatments (hand pile and manual treatment), and the no treatment option. Even though the risk of an intrusion is greatest during underburning, the severity is less because the level of emissions and the amount of fuel burned is reduced compared with broadcast and pile burning.

Underburning emissions would average 0.2 tons for each acre burned while emissions from broadcast and pile burning (both hand and tractor) would average 0.3 tons. The difference in emissions is due to the higher burning intensities needed for broadcast burning and the increase in burning efficiency when material is piled and burned. In addition, further reductions in level of emissions from underburning could be accomplished by rapid mop up of the burned area immediately after ignition. Smoldering can be responsible for up to 90 percent of the total PM₁₀ emissions produced.

Total smoke emissions and a greater chance for intrusions from prescribed burning would be the highest under alternatives no action, A, and B and lowest under the proposed resource management plan when compared with the base period. The amount of underburning would increase for alternative C and the proposed resource management plan

compared to the base period; while total emissions would be less, the potential of risk smoke intrusions may increase.

Prohibition of prescribed burning in the rural interface areas under alternatives D and E would reduce short-term adverse visibility effects and the risk of smoke intrusions into adjacent rural areas. However, there would be an accumulation of fuel, and resultant increased risk of stand replacement wildfire, which would have the potential to affect both wildfire emissions as well as to inflict property and resource damage.

Conclusions

Current avoidance strategies for prescribed fire assume that smoke can be lifted from the project site and dispersed and diluted by transport winds. However, underburning (as proposed under alternative C and the proposed resource management plan) requires a low intensity burn that would not have the energy to lift the smoke away from the project site. Smoke retained on site could be transported into portions of nonattainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas away from nonattainment areas could continue to occur during prescribed burning operations.

Alternatives no action, A, and B are projected to result in the highest total PM_{10} smoke emissions as well as greater chance for intrusions from prescribed burning. The proposed resource management plan would produce the lowest level of emissions and least risk of smoke intrusions. Alternative C and the proposed resource management plan would increase the amount of underburning compared to the base period. While emissions would be less, the risk of these lighter intrusions would increase under these alternatives.

Effects on Soils

This section describes the effects of the alternatives on soils within areas which would be managed for resource production and public use. There are two subsections - fragile sites and intensively managed lands.

Sustained yield forest management is dependent on maintaining the long-term productivity of the soil resource (see appendix S for conditions affecting long-term productivity). When soils are degraded, the capability of a site to support various natural resources is adversely affected.

Forest management practices have the potential to reduce natural productivity if certain operating guidelines are not followed. Implementation of the management prescriptions (chapter 2), mitigation measures, and best management practices in appendix G should prevent unacceptable degradation of the soil resource. Although management prescriptions, mitigation and amelioration measures have been designed to keep the extent and duration of adverse effects on soils within acceptable levels, adverse effects cannot be completely eliminated. Past monitoring has shown that actual results of applying a best management practice vary due to factors such as an operator's skill and understanding of desired results, weather conditions and amount of contract administration.

Fragile Sites

Fragile, nonsuitable woodland sites would be excluded from planned harvest under all of the alternatives. They would be managed primarily for nontimber values. However, forest management activity on some fragile nonsuitable woodland areas would occur. For instance, nonsuitable woodland sites may be located within timber harvest unit boundaries or in the alignments of roads to be constructed. When these situations are encountered, mitigation measures would be used to reduce adverse impacts (see appendix G). Despite the use of mitigation, unavoidable impacts could occur. These impacts to nonsuitable woodland sites may occur when the resource manager determines that the impact is acceptable or provides the least overall impact while meeting management objectives for a given area. For a detailed list of concerns regarding fragile nonsuitable woodland sites, see appendix G. The amount of disturbed nonsuitable woodland sites would be highest under alternatives no action, A, and B, and lowest under alternatives C through E, and the

proposed resource management plan. High levels of disturbance would reduce site productivity and the ability of a nonsuitable woodland site to support tree growth.

The fragile suitable, restricted sites would be managed using best management practices and other mitigating measures to minimize impacts from management activities. Impacts from management activities, including compaction/displacement, erosion, and long-term productivity, would still occur (see appendix G for a list of concerns). Most of these impacts would be nondetrimental or within acceptable limits. Some of these impacts may occur from unforeseen circumstances during implementation of the prescriptions.

The number of disturbed fragile restricted sites and the level of residual impacts would be highest under alternatives no action, A, and B, and lowest under alternatives C through E, and the proposed resource management plan. The probable acres of disturbed fragile sites harvested by alternative are shown in table 4-2.

Intensively Managed Lands

Under all alternatives, management prescriptions using best management practices and other mitigation measures should keep impacts from management actions within acceptable levels. However, impacts could occur from soil compaction/displacement, erosion (surface and mass wasting), alteration of nutrient status, and alteration of soil biology (see appendix S for discussion of impacts).

Compaction/Displacement

Since all management practices would be planned and implemented to avoid detrimental compaction/displacement for all alternatives, there should be less than a one percent reduction in productivity for any of the alternatives (see chapter 2). This is considered an insignificant adverse growth impact. However, alternatives A, B, and C, with the most acres of ground-based yarding and mechanical site preparation (see table 4-1), have the greatest potential to create adverse impacts from compaction/displacement. This is because of the greater risk of unforeseen circumstances in the implementation of the prescriptions.

Table 4-2 Fragile Restricted Areas Possibly Harvested by Alternative

Classification	Acres by Alternative					
	A	B	C ¹	D	E	PRMP ¹
Soil Moisture	8,810	7,800	8,710	2,800	2,400	2,340
Nutrient	9,150	7,710	5,420	2,040	1,920	510
Slope Gradient	2,750	2,650	2,510	770	0	270
Mass Movement Potential	2,450	2,400	2,440	1,200	1,180	690
Surface Erosion Potential	4,540	4,150	1,700	800	370	270
Ground Water	1,180	1,220	650	140	110	0
Total ²	20,320	18,100	16,220	6,090	4,830	3,990

¹ The harvest method in alternative C and the proposed resource management plan vary from the other alternatives in that they include large amounts of thinning acres and regeneration harvest has a high level of green tree retention within the harvest units. This would act to reduce the actual impacts in many cases when compared to an equivalent amount of clearcut acreage in the other alternatives.

² Acres are not additive. Totals are adjusted to reflect proposed acres for harvest.

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base.

Soil Erosion and Landsliding

Forest management activities with the greatest potential for accelerating surface erosion include road and landing construction, log yarding, and broadcast burning. These activities can accelerate erosion by creating more exposed and/or compacted soil. Compacted soils cannot absorb water fast enough during heavy rains to prevent runoff. Overland flow of water can cause rills and gullies. Eroded soil may move only a short distance and be redeposited on site, with minimal effect on long-term soil productivity. However, soil may be carried into streams if the erosive force is great enough. Any soil loss would have a negative effect on long-term soil productivity because soil nutrients, water supplying capacity, rooting depth, and lateral rooting would be reduced. No conclusive productivity analysis is possible due to lack of data relating surface erosion to forest soil productivity. Topsoil removal through erosion may reduce productivity. The proposed resource management plan would have the least long-term negative impacts on the areas managed for timber production due to the retention of conifers, snags, and downed wood in the General Forest Management Area, 150-year harvest rotations in the Connectivity/Diversity Blocks, and the reserve system.

Landslides can have significant on and offsite impacts on water quality, fish habitat, and long-term productivity. The Timber Production Capability Classification fragile site inventory has identified areas with soils prone to landsliding or surface erosion.

Alternatives A and B which propose to clearcut harvest more acres classified in Timber Production Capability Classification as fragile - gradient sites (see table 4-2) have the most potential for increasing the rate of landsliding compared to natural conditions. The no action alternative would be equivalent to alternative B.

Nutrient Status

Forest management practices can effect nitrogen status and associated productivity trends. The FORCYTE-11 Model (Kimmins and Scoullar 1990), is used to estimate long-term soil productivity trends for management practices addressed in the Timber section of chapter 2. The FORCYTE-11 Model is a combination historical bioassay and process-based simulation forest yield predictor computer model. It simulates yields of the various management practices and is used to estimate relative comparisons of long-term productivity trends. Because this model has not been validated, its predictive capability is uncertain.

A general description of the FORCYTE-11 Model, procedures for management prescription analyses, and results of trend analyses are shown in appendix T. Application of the FORCYTE model to the various management prescriptions of the alternatives produced the following general findings:

- The more intense the burn the more likely timber productivity and site quality would decrease over time.
- Generally, rotations of less than 300 years result in a decrease in site quality over time where there are few additional inputs of nitrogen (i.e., fertilizer applications or growth of nitrogen-fixing plants).
- As the length of the rotation increases, site quality tends to increase.
- Generally, fertilization makes up for nutrient losses, especially on shorter rotations followed by fertilizer applications over time. However, this does not maintain organic matter in the soil. Soil organic matter influences many of the beneficial soil properties such as bulk density, soil water-holding capacity, cation exchange capacity, soil biological activity, etc.
- For short rotations (less than 50 years), productivity would not be maintained when burning is used as a site preparation tool, even with prescriptions using heavy fertilizer applications.

Forest management prescriptions have a highly variable impact on long-term productivity. Harvest intensities that remove the most organic material from a site would have the most potential for decreasing long-term soil productivity. Similarly, high intensities of site preparation (e.g., high intensity, long duration fire and clean mechanical piling) would have the greatest impact. The potential for long-term soil productivity impacts would be greatest under alternatives no action, A, and B which propose the most frequent harvesting and/or site preparation activities. Long-term site productivity would be impacted least by the proposed resource management plan due to land in reserves and retention of conifers, snags, and downed wood in the Matrix. Management prescriptions are designed to avoid or minimize soil damage (see chapter 2). Prescribed burning would usually be avoided on highly sensitive soils. Burn prescriptions would be designed to protect beneficial soil properties.

Differences in management practices between alternatives are the most direct indicator of relative risk to soil productivity decreases due to reduction of organic matter. Management prescriptions that have longer rotations and leave more organic matter on

the site after logging would generally maintain or improve long-term productivity and site quality (see appendix T). Alternative C and the proposed resource management plan would use more of these prescriptions.

Differences between alternatives in the amount of land fertilized depend on the amount of land allocated for timber production. Generally, fertilization would be planned for all well-stocked stands in areas managed for intensive forest production (all alternatives except C). Fertilization would be used under alternative C to hasten development of old-growth characteristics in a stand. Fertilization would be used to enhance growth on intensively managed lands or to help restore growth on sites where nutrient status has been reduced.

Soil Biology

Forest management activities affect soil organisms. In some cases this could result in detrimental impacts to site productivity. Long-term impacts to soil organisms would be minimized by using management practices that reduce soil disturbance severity, maintain organic matter levels, and emphasize revegetation by indigenous host species and associated soil organisms (see appendix S).

Soil organisms would be affected most under alternatives no action, A, and B. The least impacts would occur under alternative C and the proposed resource management plan due to the amount of large woody debris that would be retained on sites under these alternatives.

Cumulative Effects

Under all alternatives, construction of rocked and/or excavated roads, quarries, and water impoundments are irreversible or irretrievable commitments of the soil resource.

Compaction, erosion and other impacts to soils also have an effect on water quality and water delivery (see the Effects on Water Resources section for details and descriptions).

Effects on Water Resources

Introduction

The analysis of effects of the proposed resource management plan incorporates by reference the analysis and conclusions in the SEIS regarding water quality. The following discussion and conclusions are summarized from the SEIS.

The effects to water quality under the alternatives vary depending on the acreage and distribution of the various land use allocations; also the type and location of land-disturbing activities occurring under the alternative. The most significant factors related to potential water quality effects for each alternative are the Riparian Reserves or riparian management areas, the level and location of road building, and the amount and method of timber harvest permitted.

The SEIS concluded that alternative 9 along with other SEIS alternatives with the same Riparian Reserves would have the least adverse effects to water quality. Based on the Riparian Reserves and other components of the Aquatic Conservation Strategy, alternative 9 would be expected to maintain or improve water quality. Watershed recovery rates would be quickest under this and other SEIS alternatives with the same Riparian Reserves.

Cumulative effects differ among the resource management plan alternatives primarily as a function of the alternatives' proposed level of land disturbance and Aquatic Conservation Strategy adoption. The broad-scale application of the Aquatic Conservation Strategy in the proposed resource management plan will significantly reduce the potential for adverse cumulative effects to water quality, compared to other resource management plan alternatives. Cumulative effects will be further addressed in subsequent watershed and project-specific analyses.

The Watershed Condition Index, used as an analytical technique in the draft resource management plan, has been dropped. There are two reasons for not using the index in the proposed resource management plan. First, the data used in the index is out of date due to significant logging activities on private lands. Second, the requirements for watershed analysis in the SEIS record of decision will ultimately provide a more revealing assessment of current watershed conditions. They will also provide the foundation for appropriate resource management decisions.

General Effects

All forest management activities could affect water resources. This analysis of effects focuses on anticipated management activities in the selected analytical watersheds described in chapter 3. Each watershed is analyzed to identify expected effects on stream channel condition, upland portions of watersheds, water quality parameters, and the general condition.

Because BLM-administered land is mingled with other ownerships, analysis of effects on water resources from activities on BLM-administered land alone would have little meaning. Thus, the following analytical conclusions address the cumulative effects of possible activities on BLM-administered lands under the various alternatives combined with estimated activities on private lands. Cumulative effects on rivers and streams in western Oregon tend to be the average of all effects within a watershed. This is because flows increase downstream, thereby diluting any individual impact. In contrast, effects on lakes and ground water are additive because water quantity usually remains constant. Cumulative effects over time are usually additive. In many watersheds, effects from timber management activities are short term due to rapid growth of vegetation.

Ground water quality would not be affected by the alternatives or management practices described in chapter 2. The deep soils in the Coast and Cascade ranges would effectively filter potential pollutants from entering aquifers. Activities that significantly decrease soil infiltration, such as road construction and soil compaction, would decrease the amount of water in the aquifers. These decreases in ground water quantity would be too small to measure under any alternative.

The BLM has found two river segments in the planning area suitable for designation as wild and scenic rivers. Legislation designating a river segment under the Wild and Scenic Rivers Act may reserve to the United States any previously unappropriated water in the river. Water may be reserved only in the amount necessary for the preservation and protection of features for which a particular river segment is designated. Valid existing water rights perfected under state law would not be affected by designation. Further appropriations of water could be made by nonfederal parties if those appropriations would not adversely affect the values for which the river was designated.

Upland Effects

The major potential effects from management of the nonriparian portion of watersheds would be erosion and increased water yield. Erosion from roads and other upland sources can result in sediment entering streams. Changes in vegetation and compaction levels in a watershed would alter the amount and timing of water flow to streams. Increases in vegetation removal and compaction would generally result in short-term increases in winter stream flows. Increases in peak flows would result in increased erosive energy in stream channels. This may result in increased stream channel and bank erosion. As winter peak flows increase due to compaction, less water is available for low flow periods.

Stream Channel and Riparian Effects

Successful use of the chapter 2 management prescriptions and best management practices in appendix G would maintain or improve stream channel condition. It would also prevent any significant short-term changes in the amount of large woody debris in BLM-managed streams. All alternatives except E, and the proposed resource management plan would have the long-term effect of decreasing large woody debris in first order intermittent streams. This would be the result of removing trees that are the future sources of large woody debris. All alternatives except A would have a long-term effect of increasing large woody debris in perennial streams. The proposed resource management plan would maintain and increase large woody debris in intermittent streams over time. This would be accomplished through retention of Riparian Reserves along all streams, wetlands, and potentially unstable areas.

The condition of riparian vegetation affects all aspects of the functioning of channels. The riparian section of this chapter rates the riparian condition for each stream order by alternative.

Water Quality and Quantity Effects

Water quality and quantity parameters are discussed in chapter 3. Water yields, as expressed by peak flows and increases in flood frequency and duration, would primarily be affected by the amount of compaction and area clearcut (or equivalent). Alternatives no action, A, and B, with their relative high levels of harvesting, would result in the greatest increase in

water yield. This result contrasts with lower water yields expected under alternatives C through E, and the proposed resource management plan.

Water quality on water quality limited streams would not be adversely affected by BLM management activities under any of the alternatives. Where appropriate, best management practices (see appendix G) would be used to improve existing conditions that may be contributing to cumulative water quality limitations.

The chapter 2 management prescriptions and best management practices are intended to maintain and improve riparian condition and water quality. Changes in water quality from BLM management activities under all alternatives would not violate state water quality criteria. Treated water would be provided for communities and domestic water users. Forest fertilization has not been shown to increase nitrate levels to where it would violate the Environmental Protection Agency drinking water standard. Under the proposed resource management plan, fertilizer, pesticides and herbicides would be applied in a manner that would not prevent or retard attainment of Aquatic Conservation Strategy objectives (see chapter 2).

Projected General Watershed Conditions

The projected change in general watershed condition for the selected analytical watersheds and potential cumulative effects has been analyzed for each alternative. These descriptions are for short-term effects (within the ten-year planning period) except where noted and are based on 1988 data. In some watersheds, activity on non-BLM-administered lands has altered the current condition considerably from the 1988 current condition (refer to chapter 3). In these watersheds, anticipated effects (based on an estimated harvest rate of 50 percent of the mature timber on nonfederal lands) may have already occurred or have been exceeded.

Cumulative watershed effects are generally anticipated when there is a net loss of vegetation or a net increase in compaction within a watershed. These changes may increase water yields and peak flows. Increased water yields and peak flows may increase erosion and sediment transport.

For analysis purposes, equivalent clearcut area is estimated to determine the potential amount of a watershed in a clearcut (equivalent) condition. This is

accomplished by estimating the hydrologic recovery for the vegetative component as it compares to a forested site (20 years or older) which is considered fully recovered hydrologically (see appendix U).

Total compaction levels are estimated through the anticipated amount of roads, skid trails, etc., which may occur within a watershed. A compaction level of 10 percent has shown a potential for increased peak flows. These levels would be used to help compare potential effects from management activities anticipated by the alternatives. The amount and direction of the change projected during the planning period would indicate potential changes in water yield and peak flows within the watersheds (see appendix U).

Under the proposed resource management plan, management activities would meet Aquatic Conservation Strategy objectives. The emphasis in Late-Successional Reserves would be on creation and/or retention of old-growth conditions. In Key Watersheds, emphasis would be on maintaining and improving water quality. Riparian Reserves would be established along all waters and wetlands and include unstable and potentially unstable areas. These Riparian Reserves, which underlie all land use allocations, would provide a high level of water quality and riparian protection (see chapter 2). Matrix lands would be managed according to the identified soil and water management actions/direction identified in chapter 2 and with best management practices (see appendix G). Although management activities in the Matrix would create some negative effects, these would be kept within acceptable levels.

Under alternatives no action and A through E, general watershed conditions in the majority of selected analytical watersheds are expected to decline. These declines would be primarily due to the effects of timber harvesting and road building on nonfederal lands.

The following descriptions of key changes and cumulative effects are grouped by county or counties.

Benton County

- **General** The selected analytical watersheds in Benton County are projected to be in the best general watershed condition of any group of analytical watersheds in the planning area (see appendix U). Under all alternatives, there would be little change between current and the projected cumulative compaction and equivalent clearcut area levels. Significant increases in water yields and peak flows are not anticipated to occur within these watersheds during the planning period.

- **Upper Lobster Creek** A projected recovery of riparian vegetation is expected. This may lower water temperature under all alternatives.

Polk and Lincoln Counties

- **Rowell-Gold Creek** Under all alternatives, a minor recovery in watershed conditions is anticipated. Compaction levels should be lowered through natural recovery processes, and vegetation cover will increase through growth of young stands.
- **Pedee Creek** Compaction levels are projected to increase from 14.5 percent to between 15 and 16 percent (see appendix U). Total compaction levels may increase peak flows, erosion, and sediment delivery into streams. Timber harvest could increase the equivalent clearcut area from 12 percent to 27 percent due to activities on private lands. The equivalent clearcut area could increase to 34 percent under alternative A and 30 percent under alternative B. Under alternatives D, E, and the proposed resource management plan, the equivalent clearcut area would increase primarily due to estimated activities on non-BLM-administered lands. The effects of BLM management activities on the equivalent clearcut area would be negligible. Changes of this amount may increase water yields, peak flows and flood duration, streambed/bank erosion, and sediment delivery into streams.

Openings in the watershed would increase due to anticipated timber harvest on private land and anticipated BLM harvest levels in alternatives A, B, and C. The increase in openings may increase water yield, flood durations and streambed/bank erosion.

Under all alternatives, recovering riparian vegetation is expected to result in cooler water temperatures and increased bank stability.

Minor decreases in watershed condition are projected under all alternatives.

- **Gooseneck Creek** A minor increase in openings would occur under all alternatives. The increase in openings may increase water yield, flood durations, and streambed/bank erosion. Minor decreases in watershed condition are projected under alternatives A and B.
- **Upper Rickreall Creek** There is a moderate projected increase in tractor piling areas in the watershed primarily due to estimated management activities on private lands. This would

increase compaction and soil disturbance that may cause increased peak flows and erosion rates.

Equivalent clearcut area in the watershed would increase from 9 percent to 26 percent under alternative D. Cumulative compaction levels would increase from 8 percent to 13 percent of the watershed under all alternatives. This is primarily due to estimated activities on private lands (see appendix U). Increases to these levels may increase water yields, peak flows, flood durations, erosion and potential sediment delivery to streams.

Watershed condition would be substantially decreased.

- **Mill Creek** Equivalent clearcut area in this watershed would increase from 12 percent to 21 percent under alternatives D, E, and the proposed resource management plan due to anticipated activities on private lands. It would increase up to 25 percent under alternative A. Compaction levels would increase from 5 percent to 14 percent under all alternatives. This is due to estimated activities on private lands. These increases may increase water yields, peak flows, flood durations, erosion, and potential sediment delivery to streams. Watershed condition would be substantially decreased.
- **North Fork Siletz** The watershed would have a moderate decrease in condition. This is primarily due to estimated activities on private lands, with somewhat higher effects for alternatives A and B.

Tillamook and Yamhill Counties

- **Testament Creek** Vegetative cover is projected to have a moderate recovery under alternative D and the proposed resource management plan. There would be a moderate decrease under alternatives A and B which may increase erosion due to overland flow and landslides.
- **Kilchis Frontal** A substantial decrease in cumulative condition is projected. This is due to an estimated high level of harvest on nonfederal lands. Another factor would be substantial harvest levels in alternatives A and B and moderate harvest levels in alternatives C, D, and E on BLM-administered lands. The equivalent clearcut area is projected to increase from 10 percent to 27 percent under alternative A, 30 percent under alternative B, and 20 percent under the proposed resource management plan (no final harvest activities on BLM-administered lands). This is combined with very high erodible soils, many

slopes greater than 60 percent and/or mapped critical slopes on BLM-administered lands, and a high drainage density indicating high erosion potential. Cumulative effects are lowest under the proposed resource management plan.

There would be a substantial decrease in watershed condition under all alternatives. Under alternatives A through E, the BLM would contribute to the decreases in watershed condition. The BLM's contribution under the proposed resource management plan would be negligible.

- **Clear Creek (Kilchis)** Equivalent clearcut area is projected to increase from 12 to 23 percent under the proposed resource management plan (anticipated activities on non-BLM-administered lands), 34 percent under alternative A, 31 percent under alternative B, and 29 percent under alternative D. This watershed has highly erodible soils and steep slopes that are susceptible to erosive forces when vegetative cover and other natural protection are disturbed. These factors may increase water yield, peak flows, durations of flood events, streambed/bank erosion, and sediment delivery. Cumulative effects are lowest under the proposed resource management plan. Most of the cumulative effects would occur from activities on private land. Thinning on BLM-administered lands would have a negligible impact.

There would be a moderate decrease in watershed condition under all alternatives except no action. Slightly higher adverse effects would occur under alternatives A and B; the proposed resource management plan would have the least adverse effects.

- **Other Analytical Watersheds.** The remainder of the watersheds would have only minor changes in watershed condition under alternatives C through E, and the proposed resource management plan. Some watersheds would have a moderate decrease in watershed condition for alternatives A and B (see appendix U).

Washington and Columbia Counties

- **East Fork Nehalem** Under alternative D the equivalent clearcut area would increase from 16 to 20 percent (estimated activities on private lands only), and to 24 percent (activities on all lands). Compaction would increase from 11 to about 12.5 percent under all alternatives. The estimated timber harvest would result in a minor decrease in general watershed condition. Accelerated erosion and peak flows would continue due to high levels of compaction and disturbance.

Clackamas County

- **Upper Molalla River** Compaction in this watershed is projected to increase from 11 to 12 percent under all alternatives. The high level of compaction and other disturbances may continue to cause increased peak flows and erosion rates. Watershed condition would decline slightly in the Upper Molalla River watershed. Alternatives A, B and C would have the highest adverse effects.

- **Table Rock Fork** Equivalent clearcut area is projected to increase from 5 to 14 percent under alternative C and the proposed resource management plan. This is due to estimated private activity. Under alternatives A and B, the equivalent clearcut area would increase to 21 percent (activities on all lands). Riparian vegetation would be impacted due to the estimated harvest levels and locations of potential harvest on private lands. This change in the watershed condition may increase water temperature, peak flows, and erosion rates in the watershed.

Watershed condition would decline moderately in the Table Rock Fork watershed under alternatives A and B. There would be minor decreases for alternatives C through E, and the proposed resource management plan. This is primarily due to anticipated activities on non-BLM-administered lands (see appendix U).

Marion County

- **Quartzville Creek.** Overall cumulative watershed condition would improve under alternatives C through E, and the proposed resource management plan. Alternatives A and B would cause additional minor decreases in watershed condition.

Unanalyzed Watersheds

Analysis was not applied to watersheds with small amounts of BLM-administered lands. Watershed analysis will be completed prior to the initiation of most management activities in these watersheds. The cumulative effects of proposed management activities in unanalyzed watersheds will be addressed in site-specific environmental assessments.

Conclusion

Implementation of best management practices and establishment of riparian management areas or Riparian Reserves under the alternatives would provide for varying levels of protection for water resources. However, adverse effects would not be totally eliminated.

The risk of short-term adverse effects on water quality would be highest under alternatives A and B. Management activities under these alternatives could increase levels of turbidity and sediment. These increases have the potential for noncompliance with state water quality criteria. The risk of noncompliance with state water quality criteria would be moderate to high for the no action alternative. This is due to temperature increases in some perennial nonfishery streams and increases in turbidity and sediment. Because of the moderate to low risk of increases in turbidity, sediment and temperature, alternatives C, D, E, and the proposed resource management plan would be expected to meet state water quality criteria. The proposed resource management plan will also meet the Aquatic Conservation Strategy objectives.

In the long term, the relative effects of the alternatives would be similar to those described for the short term.

Riparian and watershed enhancement activities proposed under alternatives D, E, and the proposed resource management plan would improve long-term water quality and watershed condition. This would be done by increasing vegetation for shade, stabilizing eroding streambanks and roads, and establishing vegetative cover on disturbed sites. Water quality in areas unavailable for timber harvest and restricted from surface-disturbing activities would be maintained in the short term and likely improved in the long term.

Effects on Biological Diversity and Ecological Health

This section focuses on the impacts of alternatives on biological diversity. For purposes of this analysis, biological diversity has been divided into the following components: genetic diversity, species diversity, ecosystem diversity including ecological health, and landscape diversity. Since it is difficult to conclude that any one specific measure of biodiversity is the best index for comparison between alternatives, a number of indicators of diversity have been selected for analysis. These indicators include: acres of habitat (e.g., old growth and early seral stages, hardwoods, special habitats, riparian zones, research natural areas), the abundance of snags and wildlife trees, the amount of dead and down wood, genetic diversity, and fragmentation of older forest habitat (as measured by the size and spatial arrangement of older

forest blocks). Effects of plan alternatives on biological diversity are also related to impacts on special status animals and plants, particularly threatened and endangered species. The expected short and long-term changes (compared to current conditions) in these indicators under the various alternatives are shown in table 4-3. For a more in-depth analysis of special status species refer to the Wildlife and Special Status Species sections of this chapter.

Major activities affecting biological diversity on BLM-administered lands include timber harvest and reforestation practices. Analysis of these impacts on components of biological diversity is uncertain. This is because biological diversity has not been intensively studied, and the concept is just beginning to be applied in management. Although the baseline used in this assessment of impacts is the existing situation, biological diversity can only be defined in the historic context of natural disturbances such as wildfire, windstorms and human impacts. Human activities have been affecting the ecosystems of western Oregon for thousands of years, but those effects have escalated substantially in the last 140 years, as described in chapter 3.

Lands allocated for timber production would be managed for commercial conifers under alternatives no action, A, and B. Reforestation in all alternatives would be accomplished primarily through plantings of Douglas-fir and other species, although a greater variety of species would be planted under alternative C and the proposed resource management plan. Vegetation management would subsequently be used under all alternatives (least under alternatives D, E, and the proposed resource management plan) to suppress competing vegetation (e.g., red alder, vine maple, and salmonberry) where necessary and favor the planted species. Prescribed burning after logging would be conducted under all alternatives and would affect the structure and composition of upland vegetation communities (Halpern 1987). Much of the burning under the proposed resource management plan. Burning would reduce the amount of large woody debris, kill or destroy some retained trees, inhibit the growth of most residual vegetation, and promote the growth of nonnative invader species. Gradual recovery would occur over time. The rate of recovery would be highly variable depending on the method of timber harvest, intensity of burn, site condition, and the composition of the original vegetation. The amount of prescribed burning would be greater under alternatives no action, A, and B than

Table 4-3 Expected Changes in Components of Biological Diversity by Alternative in the Short Term (10 years) and Long Term (100 years)

Components of Biological Diversity		Alternatives					
		NA	A	B	C	D	E PRMP
Older Forest	Short Term	-	--	-	0	0	0
	Long Term	-	--	-	+	++	+++
Early Seral Stage	Short Term	+	++	+	0	0	0
	Long Term	+	++	+	0	-	-
Hardwoods	Short Term	-	--	--	0	0	0
	Long Term	-	--	-	+	+	++
Special Habitats (e.g., talus, meadows)	Short Term	-	-	-	+	++	++
	Long Term	-	-	-	+	++	++
Riparian Zones	Short Term	0	0	+	+	+	++
	Long Term	0	0	+	+	+	+++
Research Natural Areas	Short Term	-	--	-	+	+	+
	Long Term	-	--	-	+	+	+
Snags/Wildlife Trees	Short Term	0	0	0	0	0	0
	Long Term	-	--	-	+	+	+++
Dead and Down Material	Short Term	0	0	0	0	0	0
	Long Term	--	--	-	+	+	+++
Genetic Diversity	Short Term	0	0	0	0	0	0
	Long Term	-	-	-	+	+	++
Fragmentation of Older Forest	Short Term	--	--	-	+	+	+
	Long Term	--	--	-	++	++	+++
Special Status Animals	Short Term	-	--	-	+	+	++
	Long Term	-	--	-	+	+	+++
Special Status Plants	Short Term	-	--	-	0	+	++
	Long Term	-	--	-	0	+	+++

Impacts: + = improving/increasing; 0 = maintaining; - = declining
 The degree of effects is shown by the number of pluses and minuses.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District resource specialists.

under alternatives C, D, E or the proposed resource management plan. Burning impacts would usually be limited to the short term.

Genetic Diversity

Studies of impacts of silvicultural practices on the genetic diversity of commercial tree species have provided conflicting results (Millar et al. 1990). However, one long-term study of Jeffrey pine in California indicated lower genetic diversity in clearcuts and overstory removal areas compared to an uncut area (Millar et al. 1990). In addition, Franklin et al. (1981) concluded that genetic change in natural forests (including the loss of specific genes or alleles) could occur by the desired exclusion of some species in planted stands. Based on these studies, alternatives C through E, and the proposed resource management plan (which retain more uncut stands and propose fewer intensive practices) would have potentially higher genetic diversity than alternatives no action, A, and B in the long term. In the short term, genetic diversity is expected to be similar under all alternatives. However, lack of consistent information prevents firm conclusions concerning these impacts within the planning area. Based on field observations of vigor and growth of planted species, genetic diversity of planted stands in the planning area is expected to be somewhat comparable to that of natural stands. Genetic diversity could even increase due to introduction of stock from a diversity of locations outside each immediate harvest area. However, a countervailing decrease could occur due to the competitive disadvantage and consequent suppression of natural seedlings of those species.

Reforestation using nursery-grown seedlings has the potential to change the genetic makeup of forest stands, whether the seed used has been produced through a genetic selection program or not. If the genetic variation of the forest is decreased through use of genetically selected or other seed sources, resistance of the trees to attacks of disease or insects or to changes in the environment may be reduced.

However, tree selection and breeding programs are designed to prevent excessive narrowing of gene pools or the complete loss of genetic traits. Moreover, genetic selection may provide the only viable method of protecting genetic material in species whose existence is threatened by plant diseases, such as the white pine blister rust.

Intensive forest management practices in alternatives no action, A, and B could lead to the isolation of some wildlife populations (e.g., spotted owl) as a result of

habitat loss. This isolation could potentially induce inbreeding resulting in loss of genetic diversity and vitality, and an increased chance of extinction (Lande 1985). Similar isolation effects have been noted for plants.

Effects of planting genetically superior stock are discussed in the Effects on Timber Resources section. Appendix L contains a discussion of BLM's tree improvement program and genetic diversity.

Species Diversity

Timber management directly affects plant and animal species diversity. Plant species diversity, as measured by number of species and relative percentage of ground cover of individual species (evenness), declines immediately following harvest of old-growth stands. However, it then increases and peaks between 15 to 20 years (Schoonmaker and McKee 1988). Some of this high diversity in early stages is due to the presence of nonnative species.

This early high diversity is generally short-lived in most managed and natural stands. Following closure of the tree canopy (usually 20 to 30 years), plant species diversity declines to its lowest level before slowly recovering again in mature and old-growth stages to levels intermediate between early seral and closed-canopy stages. However, species evenness is highest in old-growth stands. This indicates that cover of individual plants is more evenly distributed relative to each other (i.e., stands are not dominated by a few species as in early seral stages). In the long term, alternatives C, D, E, and the proposed resource management plan would have the most acres in mature and old-growth stages and least acres in the early seral stage and closed-canopy stages. In contrast, alternatives no action, A, and B would have the most acres in the earlier stages and the least in mature and old-growth stages. Figure 4-2 (short-term) and figure 4-3 (long-term) project acres by seral stage for each alternative. Alternative C would encourage plant species diversity in mid and late seral stages by providing more open-canopy conditions. Data from Schoonmaker and McKee (1988) suggest that timber management would not substantially diminish the high level of plant species diversity in the early seral stage. However, in all alternatives except C and the proposed resource management plan, timber management would likely accelerate succession. This would shorten the time in the early seral stage when that high level of diversity prevails.

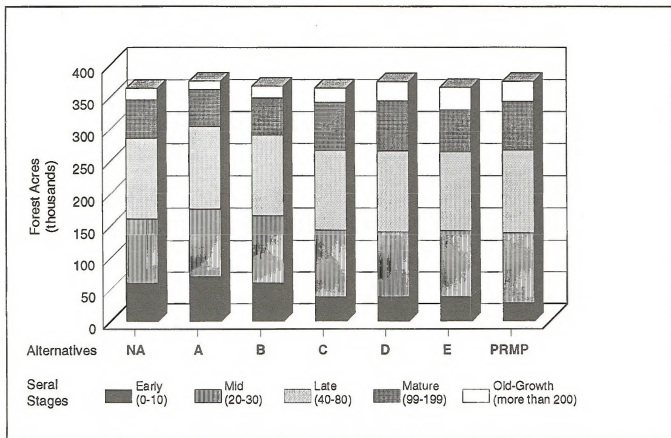


Figure 4-2 Forest Seral Stages After 10 Years

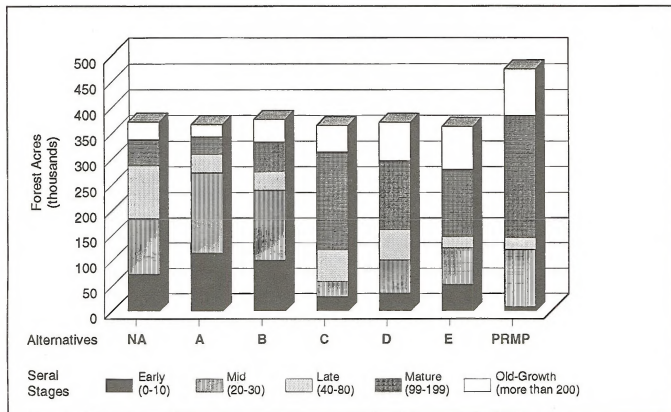


Figure 4-3 Forest Seral Stages After 100 Years

Wildlife species diversity follows a similar pattern as observed for plants with early stages providing habitat for the most species, old growth intermediate levels, and closed-canopy, pole timber stands the least (Harris 1984). Thus, on a landscape level, wildlife species diversity is greatest when the forest is dominated by a mix of old growth/mature and early successional stages. The mix, if it includes some large, interior older forest patches, favors forest interior species and those adapted to edge habitats (Logan et al. 1985). Bruce et al. (1985) showed that the early seral stage provides feeding habitat for the most number of animal species, while mature and old-growth forests provide breeding habitat for the most species.

Species that prefer early successional habitats are habitat generalists. They have evolved characteristics which enable them to survive in these rather fleeting environments. These characteristics include: rapid population growth, wide dispersal capacity, and relative flexibility in habitat requirements. Old-growth related species, adapted to a more stable habitat, tend to be specialists that often have relatively slow population growth rates and poor dispersal capabilities (Crow 1990). Alternatives that maintain or increase old growth would benefit species diversity more than those that maintain or increase the early seral stage. This is because the habitat of relatively inflexible old-growth specialists would be maintained.

Models of vertebrate species response to habitat fragmentation show that species diversity would begin to decline when 50 to 75 percent of the landscape is cutover under a harvest rotation system that does not allow for the development of late-successional forests (Lehmkuhl et al. 1991). Lehmkuhl and Ruggiero (1991) developed a vulnerability analysis of 93 species associated with late-successional coniferous forests of the region. Eighty percent of the species fell into the moderately high and high risk categories.

Ecosystem Diversity

Mature and old-growth forests are the most limited habitat available in the planning area (Harris 1984). As discussed previously, more of this habitat would be provided under alternatives C, D, E, and the proposed resource management plan than under alternatives no action, A, and B in the long term. Under alternative C, it is assumed that 40 percent of the stands managed to retain more than 35 percent retention of total basal area at regeneration harvest would possess old-growth characteristics (as defined by the Old-Growth Definition Task Group) in the long

term. Another 40 percent would be mature forest. It is also assumed that 33 percent of stands managed to retain 15 to 20 percent retention of total basal area at regeneration harvest would be mature forest 100 years from now.

Most forest lands intermingled with BLM-administered lands in the checkerboard ownership pattern of the planning area are privately owned, with a substantial portion owned by wood products companies. Most of these lands have been, and are expected to be managed intensively for timber production in the future. The relatively short harvest rotation on many private forest lands means that, at any given time, the early seral stage would be predominant with most of the remaining lands in the mid seral stage. Little mature and old-growth forest would remain on these lands. Thus, mature and old-growth forests on BLM-administered lands and other national forest lands would provide essentially all this habitat remaining in the planning area.

Recent Forest Service and Wilderness Society estimates show about 1.9 million acres of old-growth forest remaining on national forest lands in western Oregon. Added to the approximately 400,000 acres of old-growth stands on BLM-administered lands in the region, this represents 15 percent of all western Oregon forest lands. In contrast, it has been estimated that prior to settlement, 60 to 70 percent (the amount was not static but fluctuated) of western Oregon and Washington forests were old growth (Franklin and Spies 1984). However, one subregional study shows that only 40 percent of much of the Oregon Coast Range was old growth in 1850 (Teensma et al. 1991).

Although the Forest Service has not yet calculated the acreage of old-growth stands on national forests in western Oregon that would be retained under the SEIS record of decision, comparison of analyses in the SEIS and in the Forest Service's 1992 spotted owl environmental impact statement suggests that it would be approximately 1.5 million acres. BLM's six proposed resource management plans for western Oregon would provide for the retention of approximately 288,000 acres of old growth, which would result in a cumulative total approaching 1.8 million acres. As existing younger stands age and develop old-growth characteristics, BLM-administered lands in western Oregon are expected to support 336,000 acres of old-growth stands after 10 years and 718,000 acres after 100 years. These figures make allowance for anticipated losses due to catastrophic events.

Projection of the recent wildfire record noted in chapter 3 indicates about four percent of BLM-administered forest lands could burn in stand-replacing fires in the next 100 years. This potential reduction could be applied to the acreage of older forest stands projected to exist in the long term (see figure 4-3) under each alternative. Land tenure adjustments under alternatives C, D and E would increase the acres of mature and old-growth stands primarily in the long term.

The proposed harvest of about 470 acres of old-growth stands under the proposed resource management plan would cause a slightly adverse reduction in biological diversity. It would also cause an irreversible and irretrievable commitment of resources, at least for the time it would take to recreate those stands.

Another important aspect of ecosystem diversity is the variety of special habitats (e.g., talus slopes, cliffs and meadows) that exist on BLM-administered lands in the planning area. These habitats would be most protected under alternatives C, D, E, and the proposed resource management plan (see table 4-3), which would buffer them from management activities or otherwise provide protection based on SEIS survey and manage provisions. Under the other alternatives, special habitats could be vulnerable to incidental disturbance from activities adjacent to these habitats. Special habitats could be impacted by mineral exploration and development activity on mining claims under all alternatives. However, the probability of such impacts are considered low due to the lack of mineral exploration and mining claim activity on BLM-administered lands in recent years.

The 30,600 acres of hardwood stands on BLM-administered lands provide another important element of ecosystem diversity. On lands allocated for timber production, hardwoods would be reduced by conversion of some lands (those considered to be conifer sites) to conifer production under all alternatives. Such conversion would merely return conifers to lands previously converted to hardwoods as a result of poor reforestation following logging or other factors. However, this reduction in hardwood habitat would reduce species and ecosystem diversity in affected areas. In the short and long term, fewer hardwood acres would be converted under alternatives no action, C through E, and the proposed resource management plan compared to A and B (see table 4-3).

The amount and condition of riparian zones and special areas including research natural areas are other indicators of effects on ecosystem diversity. They are discussed in greater detail in the subse-

quent sections, Effects on Riparian Zones and Effects on Special Areas. In general, riparian zones and special areas would receive increasingly greater protection under alternatives B through E, and the proposed resource management plan compared to other alternatives (see table 4-3).

In the short term, the number of snags/wildlife trees would be comparable to the existing condition under all alternatives. In the long term, alternatives C through E, and the proposed resource management plan would enhance the availability of snags and wildlife trees compared to alternatives no action, A, and B (see table 4-3). Uneven-aged management under alternative C would emphasize retention of structural diversity in the short and long term. Effects on snags and wildlife trees are discussed in greater detail in the subsequent Effects on Wildlife Habitat section.

Alternatives C through E, and the proposed resource management plan would also enhance the availability of dead and down woody material compared to alternatives no action, A, and B in the long term (see table 4-3). However, in the short term, similar levels of dead and down material are expected under all alternatives. This is supported by district inventory data indicating comparable tonnage levels (range of mean tonnage levels: 24 to 32 tons per acre) for dead and down logs in existing stands within the following age classes: 1 to 35 years, 36 to 85 years, and 86 to 195 years. Higher mean tonnage levels (38 tons per acre) were recorded in old-growth stands though statistical tests were not conducted to evaluate differences between age classes. Since large dead and down woody material decays very slowly and all alternatives would leave some of this material in harvested areas, only small differences among the alternatives are expected in the amount of this material remaining in the short term. In the long term, however, those lands planned for clearcut harvest at relatively short intervals would not produce the large trees capable of contributing large down woody material. Thus, within 100 years, such material would largely disappear from intensively managed forests.

Cumulative effects of the alternatives and actions on other lands in the planning area are expected to reduce the aggregate amount of dead and down woody material. Most private timber companies use intensive management practices and manage on short rotations, activities which would limit the amount of this material in the short and long term.

Functions and processes of ecosystems were evaluated for the range of the northern spotted owl in the SEIS. The SEIS concluded that alternative 9 in the

long term may not produce an outcome in which the quality of the overall late-successional forest ecosystem would be at least as high as the hypothesized long-term average condition. The SEIS concluded that a longer timeframe may be necessary for this change to occur.

Ecological Health

The SEIS assessed the effects of alternatives on ecosystem quantity and quality (abundance and diversity, processes and functions, and connectivity); global change; aquatic ecosystems; air quality; risk of large-scale disturbances by fire, wind, insects, and disease; water quality; and long-term soil productivity. These analyses in part reflect ecological health considerations of the entire forest ecosystem in the range of the northern spotted owl. SEIS conclusions relative to these analyses are briefly summarized as follows:

- During the next 100 years, alternative 9 may not produce an outcome in which the quality and quantity of the overall late-successional ecosystem would be at least as high as the hypothesized long-term average condition. The SEIS concluded that a longer timeframe may be necessary for this change to occur;
- The primary global effect under alternative 9 relates to the quantity of carbon dioxide released to the atmosphere. However, alternative 9 is expected to result in only a very slight increase in global atmospheric carbon dioxide levels;
- Alternative 9 is expected to reverse the trend of degradation of aquatic ecosystems on federal lands. This includes recovery of riparian, aquatic, and watershed processes in all watersheds;
- Alternative 9 is expected to have moderately high potential impact on air quality resulting from prescribed burning;
- Alternative 9 is expected to have the highest risk of large-scale wildfires within the dry and intermediate provinces and least for the moist provinces. However, this risk can be reduced by vegetation modification such as proactive fire and fuels management including thinning and prescribed fire. Vegetation modification can also reduce the risk of large-scale disturbance caused by wind, insects and disease;
- Alternative 9 is expected to have low impacts on water quality; and
- Alternative 9 is expected to have moderate impacts on long-term soil productivity relative to the expected level of soil disturbance.

Landscape Diversity

A significant aspect of landscape diversity is fragmentation of mature and old-growth forest stands. Of concern are the size of remnant blocks and their isolation or spatial arrangement. Over most of the planning area and for all alternatives, the number of large blocks available in the short term may not provide adequate habitat for wide-ranging, forest interior animals such as marten and fishers. Although data are largely lacking, forest interior species would probably be supported by blocks in the long term under alternatives C, D, E, and the proposed resource management plan.

In all alternatives, many of the blocks identified would be dissected by roads not planned for closure due to the need for:

- Continued use of existing roads for access to other lands including lands in private ownership;
- Additional road construction under terms of existing reciprocal right-of-way agreements; and
- Additional road construction by the BLM to provide access to other lands for resource management, if alternative access routes are considered more ecologically damaging. Impacts of existing and possible future roads have not been considered in identification of interior habitat. However, they would probably diminish the quality of the habitat in these blocks.

In the short term and under all alternatives, blocks predominately stocked with mature and old-growth forest would be concentrated in the southern portion of the planning area. This reflects the current distribution of older forest habitat in the district. Connectivity between blocks would be provided by the extensive pattern of lands excluded from timber harvest under alternative E and less so under alternative D. Blocks provided under alternative C would be connected by BLM-administered lands managed by partial cutting. These would retain substantial mature and old-growth forest characteristics throughout time. Blocks provided under the proposed resource management plan would be connected primarily by Riparian Reserves to the extent possible in a checkerboard ownership pattern. Limited connectivity would be provided under alternatives no action and B in the form of small blocks which would serve as stepping stones between larger reserved blocks. Least connectivity would be available under alternative A.

Large intervals of young forest between old-growth stands can lead to isolation of some species of animals and plants that rely on these habitats. The resulting inbreeding can reduce the ability of these species to survive.

Conclusion

In the short term, genetic diversity, snags/wildlife trees, and dead and down woody material are expected to remain comparable to existing conditions. In addition, several elements of biodiversity would be benefited in the short term under alternatives C through E, and the proposed resource management plan (e.g., special habitats, riparian zones, research natural areas, blocks of older forest, and special status animals). In the long term, most elements of biodiversity would be benefited under alternatives C through E, and the proposed resource management plan. One exception would be the early seral stage which would decline under these alternatives.

Effects on Vegetation Including Special Forest Products

General

The amount of forest management activities would generally affect the availability of vegetation under all alternatives by impacting the mix of successional stages in the planning area. These activities would also affect the habitat of special status plant species on a site-specific basis. These effects are addressed in a subsequent section of this chapter. Also related to effects on vegetation are impacts on riparian zones and biological diversity which are discussed in other sections of this chapter. In the latter section, effects on the structure, composition and fragmentation of the forest are analyzed.

Under alternatives no action, A, and B, the BLM-administered forest lands would continue to be primarily a patchwork of even-aged stands of various ages. Grasses, forbs, and shrubs would tend to be more common under these alternatives especially in younger and older stands rather than mid-aged stands (see Effects on Biological Diversity and Ecological Health section). Mature and old-growth

stages would continue to decline under these alternatives. The forest would be the most complex under alternative C and the proposed resource management plan. For example, some lands would be allowed to mature; others would be selectively harvested leaving biological legacies in the form of green trees, snags, and dead and down wood; and others would be characterized by a patchwork of even-aged stands. Under alternatives D, E, and the proposed resource management plan, large areas would be allowed to mature, altered only by natural disturbances such as wildfires, windstorms, and insect or disease infestations; or in the case of the proposed resource management plan, thinning activities designed to create old-growth-like conditions more rapidly.

Figure 4-2 (in the preceding Effects on Biological Diversity section) shows the percentage of coniferous forest under each alternative that would occur in each of five seral stages after ten years.

Proposed roads under all alternatives would eliminate vegetation within road clearings (see table 2-1). More vegetation would be removed under alternatives A and C than under other alternatives.

The use of vegetation management practices, including herbicide application, would suppress unwanted vegetation but not eradicate it. Other forest management practices, such as thinning and fertilization, would affect growth rates of Douglas-fir and other species, and thus affect succession.

For impacts on special vegetation communities, see discussion under Special Habitats in the Effects on Wildlife Habitat section and under Ecosystem Diversity in the Effects on Biological Diversity and Ecological Health section.

One species of special interest, the Pacific yew, is not defined as a special status species. The impacts of Pacific yew management have been addressed in an environmental impact statement prepared by the Forest Service, with the BLM as a cooperating agency (U.S. Department of Agriculture, Forest Service 1993a).

Increased road access, particularly under alternatives A and C, would provide additional opportunities for the spread of noxious weeds. However, implementation of the control measures described in the noxious weed control program (U.S. Department of the Interior, BLM, OSO 1987), would stabilize or reduce noxious weed populations on BLM-administered lands.

If transferred to private ownership, some BLM-administered lands are expected to be managed more intensively. Thus vegetation could be altered. Current private land uses in rural sections of the planning area are primarily farming, timber production, livestock ranching and recreation. Use would be restricted by state laws and local regulations and land use ordinances.

Refer to Effects on Wildlife Habitat section in this chapter for a discussion on special habitat types.

Special Forest Products

The alternatives would affect the availability of special forest products primarily in two ways:

- by the degree to which they permit special forest products harvest to occur (see chapter 2); and
- by the objectives and silvicultural systems chosen to meet timber management and forest health objectives.

Alternatives no action, A, and B would provide the largest number of acres open/unrestricted for special forest products harvest. Alternatives C, D, E, and the proposed resource management plan would have the fewest number of acres open/unrestricted.

In general, special forest products which are shade intolerant would be favored under alternatives no action, A, and B. Those which are shade tolerant would be favored under alternatives C, D, E, and the proposed resource management plan. Likewise, special forest products adapted to younger forests would be favored under alternatives no action, A, and B. Those more adapted to older forests or forests containing older components would be favored under alternatives C, D, E, and the proposed resource management plan.

Access to harvest sites is also a factor in special forest products availability. Alternatives A, B, and D contain the greatest number of miles of proposed road construction. Alternative E, and the proposed resource management plan propose the least amount of road construction.

Table 4-4 displays the projected effects of the alternatives on the availability of special forest products.

Properly harvested, many special forest products can sustain repeated harvests with little or no short-term effects on resource availability. Products capable of repeated harvests are generally those with root

Table 4-4 Effects of the Alternatives on the Availability of Individual Special Forest Products Being Harvested

Specific Product	Alternatives						
	NA	A	B	C	D	E	PRMP
Products derived from conifers and hardwoods ¹	0	+	+	-	-	-	-
Cones	0	0	0	0	0	0	-
Christmas trees	0	0	0	-	-	-	-
Wildlings	0	x	x	x	x	x	-
Cascara bark	0	0	0	-	-	-	-
Moss	0	-	-	+	+	+	-
Boughs	0	0	0	-	-	-	-
Herbs	0	x	x	x	x	x	-
Mushrooms	0	-	-	+	+	+	-
Burls	0	-	-	-	-	-	-
Huckleberry	0	+	+	0	0	0	-
Ferns	0	+	+	+	+	+	-
Beargrass	0	+	+	+	+	+	-
Greenery	0	+	+	x	x	x	-

¹ Sawtimber, pulpwood, marginal logs, cedar bolts and shakes, corral poles, small poles, split rails, line posts, corner posts, fence stays, and fuelwood.

Impacts: + = availability would increase; 0 = no change in availability; - = availability would decrease; x = unknown or species dependent until watershed analysis is completed.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District resource specialists.

systems that are not disturbed during harvest operations. These include perennials, species which grow from rhizomes, such as salal and Oregon grape, and many hardwoods which sprout from stumps. Mushrooms are also capable of repeated harvest provided the below surface parent mycelium remains healthy. For some species light disturbance may stimulate growth of new vegetation and production of mushrooms. As the demand for special forest products increases, the probability of adverse impacts (e.g., over harvesting) would also increase.

Effects on Riparian Zones

Under all alternatives, wetlands would be managed to protect their primary values. However, the proposed resource management plan offers the best protection by providing wide buffers around wetlands.

The effects of the alternatives on riparian zone conditions adjacent to streams and other waters would vary depending upon the width of riparian management areas or Riparian Reserves and the amount of vegetative disturbance occurring in those areas. Expected conditions of riparian zones in the short and long term are shown in table 4-5. Under all alternatives except A, general riparian conditions on BLM-managed stream segments would continue to improve in the short term because of increasing maturity and diversity of riparian vegetation. At the end of ten years, 32 percent of the riparian acres would be in minimal condition (classes 1 and 2), 36 percent in fair condition (class 3), and 32 percent in

good/optimal condition (class 4). At the end of 200 years, expected riparian conditions under alternatives B through E, and the proposed resource management plan would be good/optimal. The best conditions would occur under the proposed resource management plan which has the widest Riparian Reserves including intermittent streams. These wide reserves would provide high levels of woody debris recruitment, animal and vegetation diversity, and protection of stream channels, banks and water temperature. Long-term conditions under alternative A would be fair due to narrow riparian management area widths (i.e., minimal vegetation diversity). Under the no action alternative, long-term conditions would be fair due to lack of riparian management areas on all perennial first order streams and many perennial second order streams.

Road and log-yarding corridors through riparian zones would affect varying amounts of live, mature vegetation under all alternatives. These corridors would likely affect more vegetation under alternatives no action, A, and B than under alternatives C through

Table 4-5 Estimated Condition of Riparian Zones

Stream Order	Acres of Each Condition Class ¹ by Stream Order								Long-Term ³ Condition	
	Existing Condition				Short-Term ² Condition					
	1 min.	2 min.	3 fair	4 good+	1 min.	2 min.	3 good+	4 good+	4 good+	Total Acres
Second	2,950	2,270	3,180	2,650	1,000	3,200	3,820	3,030	11,050	11,050
Third	1,560	1,840	2,140	2,110	530	2,040	2,710	2,370	7,650	7,650
Fourth	900	1,040	1,480	1,460	310	1,160	1,770	1,640	4,880	4,880
Fifth	370	630	880	930	130	590	1,060	1,030	2,810	2,810
Sixth	140	440	800	870	50	330	900	970	2,250	2,250
Seventh	10	30	20	30	0	30	30	30	90	90
Eighth	0	10	10	50	0	0	10	60	70	70
Total	5,930	6,260	8,510	8,100	2,020	7,350	10,300	9,130	28,800	28,800

¹ Riparian condition class equates to size of trees (diameter at breast height) in riparian zones:

- Class 1 (minimal condition) = 0-5 inch trees
- Class 2 (minimal condition) = 5-11 inch trees
- Class 3 (fair condition) = 11-21 inch trees
- Class 4 (good/optimal condition) = 21 inch plus trees

² End of short term (10 years). Estimated changes from existing conditions:

- 66 percent of class 1 goes to class 2
- 45 percent of class 2 goes to class 3
- 12 percent of class 3 goes to class 4

³ End of long term (200 years); does not include alternative A.

Source: Salem District timber inventory.

E, and the proposed resource management plan because of more logging on upslope areas (i.e., more need to cross streams). These impacts would be fairly localized. Adverse consequences would be partially mitigated by leaving downed trees in the riparian zone. In some situations, mature hardwoods could be replaced by conifer seedlings which would eventually grow into a longer lasting source of standing trees and downed, woody debris. See subsequent sections on Effects on Wildlife Habitat and Fish Habitat for additional details.

Effects on Wildlife Habitat

Introduction

Habitat indices were calculated for some priority habitats and species for the existing condition and alternatives by use of habitat models (U.S. Department of the Interior, BLM, OSO 1991). Several of these models have received wide professional acceptance; for example, elk (Wisdom et al. 1986) and cavity dwellers (Marcot 1991, Neltro et al. 1985). Others were derived by BLM biologists and planners specifically for this and other western Oregon BLM environmental impact statements. The analysis of wildlife effects is based in part on the analysis in the SEIS where applicable. Indices derived under the various models predict such factors as the amount, quality, and distribution of habitat. The assumptions and analytical approaches for each wildlife habitat model are found in appendix V. In cases where habitat models were unavailable or were not derived, analysis of impacts was based on literature references or personal communications with experts.

Effects on Habitat

Forest management activities affect wildlife primarily by modifying habitat. Thomas (1979) and Brown (1985) indicated that certain wildlife species are associated with forests of a particular age class and structure. The close affinity of wildlife for specific habitat conditions underscores the importance of analyzing impacts of forest management activities on habitat composition.

The assessment of impacts on habitat is based on the expected availability of conifer, special and riparian habitats under each alternative in relation to the existing condition. The impacts of road construction and access on all habitat are also analyzed. Also

related to effects on wildlife, and discussed in previous and subsequent sections are effects on vegetation and biological diversity (including discussions of dead and downed wood and hardwoods). Effects on special status and SEIS special attention species and habitat are addressed in a subsequent section of this chapter.

Conifer

Conifer forests comprise the dominant habitat (91 percent) of BLM-administered lands in the planning area. Habitat composition under the various alternatives is displayed in the discussions of Effects on Vegetation and Biological Diversity.

The current age class distribution in the district is dominated by a large amount of younger age classes (see table 3-16). Maintenance of the current distribution would limit the abundance and distribution of wildlife species preferring mature and old-growth habitat. Continuation of a forest dominated by younger age classes would occur under all alternatives through the next decade (see figure 4-2). This condition would be alleviated in the long term under alternatives C through E, and the proposed resource management plan, but alternatives no action, A, and B would maintain the age class distribution close to the existing situation in the long term. The abundance of species preferring early seral stages would likely be reduced under alternatives D, E, and the proposed resource management plan in the long term due to less timber harvest. However, additional early successional habitat will continue to be created through logging and other management activity on nonfederal land to reduce this effect. Alternative C, with its emphasis on density management harvesting, would result in mixtures of openings and residual tree cover in specified areas of the district. The effects on wildlife from density management thinning are likely to be both beneficial and adverse, depending on the species.

In the long term, alternative C would likely provide moderate levels of old-growth species and species preferring early-seral stages compared to the existing situation; alternatives no action, A, and B would provide higher levels of early successional species and lower levels of old-growth associated species; and alternatives D, E, and the proposed resource management plan would provide higher levels of old-growth associated species and lower levels of early successional associated species. Moderate abundance levels of species anticipated under alternative C compared to the existing situation would result from management for older-forest habitat elements interspersed among some younger forest stages.

Cumulative effects from activities on BLM-administered lands and actions on other lands (i.e., private and other public lands) would be detrimental to older-forest habitat and species requiring mature and old-growth habitats under alternatives no action, A, and B. Reductions in mature and old-growth habitat would be an unavoidable adverse impact. Widespread clearcutting on private lands in conjunction with harvest rates on public lands has created an age class distribution dominated by younger age classes throughout western Oregon (Oregon Department of Forestry 1990). This cumulative effect and the probability that such timber harvest practices would continue on most private lands magnify the importance of mature and old-growth habitat on public land as a relatively scarce regional habitat. Cumulative effects from adoption of alternatives C through E, and the proposed resource management plan would be less detrimental to older-forest habitat because of increased protection on BLM-administered lands. Alternative D and the proposed resource management plan would lead to more mature and old-growth habitat than currently exists on BLM-administered lands.

Special Habitats

The primary resource feature in special habitats (e.g., meadows, rock cliffs, and talus slopes) would be protected under each alternative. Intact forest buffers do not exist around some of these habitats. Alternatives no action, A, and B do not afford buffer protection for special habitats, whereas protected buffer areas under alternatives C through E would range from 100 to 300 feet. The proposed resource management plan provides protection for special habitats based on interdisciplinary review and determination of relevant values for protection or management on a case-by-case basis (see chapter 2, Special Status and SEIS Special Attention Species and Habitat). This level of protection is equivalent to alternative C. Of particular importance in these determinations will be the habitat of species for which the SEIS record of decision provides protection buffers. In addition, the proposed resource management plan, which ties to the management direction adopted in the SEIS record of decision, includes survey and manage and protection buffer provisions that would benefit special habitats. Many rare or geographically restricted species are associated with these habitats. The SEIS discussed the importance of special habitats (e.g., rock outcrops, bogs, and wetlands) to rare and local plants; and the importance of springs or seeps to rare and/or endemic mollusks. Studies in the Salem District determined that removal of tree cover along

edges of small meadows reduced bird density and caused changes in bird species composition (Monthey 1983). Special habitats on adjacent Forest Service lands would be protected the same as BLM-administered lands, but little protection is anticipated on private lands.

Riparian

Riparian habitat conditions for wildlife would generally improve under all alternatives except A because of increasing maturity of riparian vegetation. However, the amount of riparian habitat protected would vary by alternative. Progressive increases in protected riparian habitat would occur from alternatives no action through the proposed resource management plan (see table 2-1), ranging from 23,400 acres in the no action alternative to 221,800 acres under the proposed resource management plan. Thus, wildlife species that prefer or are dependent on riparian habitat would be expected to increase in the long term under alternatives C through E, and the proposed resource management plan compared to alternatives no action, A, and B. Riparian habitat adjacent to wetlands would not be protected under alternatives no action, A, and B. However, these areas would be protected under alternatives C through E by 100 to 300 foot buffers and by the proposed resource management plan. See Effects on Riparian Zones section for additional details. Cumulative effects would follow a similar pattern for the various alternatives.

General Habitat

Roads have generalized impacts on all wildlife habitat by direct elimination of vegetation within rights-of-way (BLM roads and roads constructed under reciprocal rights-of-way agreements), and by disturbance of wildlife caused by increased human access. Big game species are especially vulnerable to these road impacts (Brown 1985). Road construction resulting from timber management under alternative C would have the greatest adverse effect on wildlife habitat; alternatives no action, A, and B would have intermediate effects; and alternatives D, E, and the proposed resource management plan would have the least effects. Wildlife populations that benefit from less human disturbance and the overall quality of habitat would likely increase under alternatives D, E, and the proposed resource management plan. Cumulative effects caused from activities on BLM-administered lands and other lands would be detrimental to wildlife because of high road densities estimated to occur on the latter lands (especially on nonfederal lands).

Effects on Priority Species

This section covers Roosevelt elk, dominant woodpeckers, accipiter hawks, golden eagle, great blue heron, neotropical migrants, osprey, amphibians, black bear, black-tailed deer, and mountain lion. Discussions of spotted owls, bald eagles, marbled murrelets and other species are included under Special Status and SEIS Special Attention Species and Habitat.

Roosevelt Elk

The assessment of impacts on Roosevelt elk habitat on BLM-administered land was based on a modification of the elk habitat effectiveness model developed by Wisdom et al. (1986) (see appendix V). The Wisdom Model was modified by dropping the spacing index (HEs) and by presenting values for each index rather than producing a composite score for all indices. This modification was agreed to by the Oregon Department of Fish and Wildlife. Because the model has not been validated, its predictive capability is uncertain. Only analytical watersheds exceeding 25 percent BLM ownership were included in the analysis. This percentage was selected as the level at which BLM management would have significant impact on elk habitat.

Assessments of short-term impacts on elk habitat under the various alternatives are shown in table 4-6. Impacts on elk vary by watershed based on existing conditions of habitat relative to proposed actions. Generally, impacts would have more adverse effects under alternatives no action, A, and B. This would be caused by higher levels of harvesting in watersheds short on optimal thermal cover and more road construction in watersheds with high road densities. Alternative C would have mixed impacts on elk. Although there are fewer clearcut acres proposed, there are some adverse impacts. These are primarily related to high levels of road construction and additional habitat modification caused by extensive thinnings. Thinnings tend to reduce thermal cover while not increasing forage levels significantly compared to clearcuts. However, forage levels on adjacent private lands should be adequate. Adverse impacts on elk would generally be less under alternatives D, E, and the proposed resource management plan. This is primarily due to lower levels of harvest and fewer road impacts including possible closures of roads due to watershed concerns. Less available forage on BLM-administered lands under these alternatives would be partially balanced by the availability of forage on adjacent nonfederal lands.

Although long-term impacts on elk habitat were not quantitatively assessed (because a long-term timber management scenario was unavailable), improvements in habitat and populations under alternatives D, E, and the proposed resource management plan are anticipated. This is due to increased levels of optimal thermal cover and potentially fewer timber harvest impacts. Optimal thermal cover would be available under alternative C in restoration and retention areas; under alternative D in habitat conservation areas; under alternative E in 150-year and older stands and other protected wildlife habitat; and under the proposed resource management plan in Late-Successional Reserves and other reserves.

Cumulative effects of combined activities on BLM-administered lands and actions on other lands in the planning area are expected to cause a general decline (not necessarily in individual watersheds, however) in elk habitat quality and in numbers of elk under alternatives no action, A, and B. This expected decline is due to anticipated low levels of thermal cover and more road construction in watersheds with already high road densities. An improvement in habitat quality and elk numbers is anticipated under alternatives D, E, and the proposed resource management plan in the long term despite less than optimal conditions on private lands. Alternative C would affect elk by high levels of road construction and habitat modification caused by extensive thinnings on BLM-administered lands in combination with high anticipated clearcutting on adjacent private lands. Elk habitat on private lands is mostly younger seral stages which provide abundant forage and increasing amounts of thermal cover. Road densities are often high on private lands, and clearcuts are usually larger than on BLM-administered lands. This causes less forage/cover edge habitat. Forage would still be available for elk using cover on BLM-administered lands under alternatives D, E, and the proposed resource management plan because of intensive timber harvest on adjacent private lands.

An unavoidable adverse impact of the proposed resource management plan on elk habitat is the reduction in the amount of optimal thermal cover, which is considered an important component of elk habitat (Brown 1985). This reduction is considered an irreversible or irretrievable commitment of resources due to the length of time required in regenerating these stands. Although reduced habitat availability from the elimination of optimal thermal cover may have adverse impacts on the population size of elk herds, additional optimal habitat is expected in Late-Successional Reserves over time as regrowth of this habitat occurs.

Table 4-6 Assessment of Short-Term Impacts on Elk Habitat in the Planning Area

Analytical Watershed	Existing Condition			Predicted Change After Ten Years by Alternative ¹						
	Road Density ²	Habitat Forage ³	Effect. Cover ⁴	NA	A	B	C	D	E	PRMP
Alsea Frontal	5.0	0.26	0.36	-	--	--	--	-	-	-
Bear Creek	5.2	0.24	0.46	-	-	-	-	+	-	+
Bible Creek	4.2	0.24	0.47	-	-	0	0	0	0	-
Clear Creek (Kilchis)	4.1	0.24	0.34	-	0	0	0	0	0	0
Crooked Creek	4.2	0.14	0.22	-	0	0	--	-	0	-
East Fork Nehalem	5.9	0.14	0.33	-	0	0	0	-	0	-
Elk Creek (Nestucca)	4.6	0.23	0.44	-	--	0	0	0	-	-
Fall Creek	4.7	0.43	0.47	-	--	--	0	0	-	0
Gooseneck Creek	4.6	0.14	0.17	-	0	0	0	0	0	+
Kilchis Frontal	3.3	0.44	0.44	-	0	0	0	0	0	+
Lower Lobster	3.9	0.46	0.44	-	--	--	--	0	--	0
Lower South Fork Alsea	4.9	0.19	0.44	-	--	--	--	--	--	0
Mill Creek	3.6	0.26	0.29	-	--	-	--	0	0	0
Moon Creek	4.3	0.25	0.48	-	--	-	-	0	-	+
North Fork Alsea	4.7	0.30	0.45	-	--	--	--	0	--	+
North Fork Siletz	5.1	0.16	0.37	-	--	--	--	0	0	0
Pedee Creek	4.8	0.29	0.60	-	+	+	+	0	0	0
Quartzville Creek	5.1	0.26	0.86	-	--	--	--	-	0	-
Rowell-Gold Creek	4.4	0.29	0.38	-	-	-	--	0	0	0
Table Rock Fork	3.9	0.33	0.59	-	--	--	-	+	-	+
Testament Creek	5.3	0.28	0.48	-	-	-	-	0	-	+
Upper Lobster	4.2	0.29	0.31	-	--	--	--	0	0	0
Upper Molalla River	5.0	0.24	0.48	-	-	-	--	0	-	+
Upper Nestucca	5.3	0.24	0.58	-	-	-	+	0	-	-
Upper Rickreall Creek	3.5	0.17	0.10	-	0	0	0	0	0	-
Upper South Fork Alsea	5.4	0.18	0.41	-	--	--	--	--	0	-
Upper Willamina	4.7	0.23	0.32	-	--	--	--	-	--	-

¹ Change based on projected increases or decreases in proposed acres harvested and new roads constructed in contrast to the existing condition (see appendix V) for description of analytical technique).

Impacts: - = declining condition; 0 = no change; + = improving condition.

Individual ratings were estimated as follows for all alternatives except the PRMP:

When HE_c is less than 0.5,

When HE_c is greater than 0.5,

Road Constr/ Decade (mi.)	Rating	Decade (ac.)	Harvest/ Rating	Decade (ac.)	Harvest/ Rating
0-1	0	0-400	0	0-400	0
1-2	-	400-1000	-	400-1000	+
2+	--	1000+	--	1000-3000	-
				3000+	--

Assessment of impacts for the proposed resource management plan was based on the amount of late-successional reserve and other reserves within Analytical Watersheds relative to the amount of general forest management area or adaptive management area.

The consolidated rating was based on based on the severity of the individual ratings (i.e., a - rating for road density, and a - rating for cover quality resulted in a - consolidated rating. This assumes that each factor can independently limit elk habitat condition.)

² Calculated for BLM and other lands within watersheds exceeding 25 percent BLM-administered lands. Numbers are road miles per square mile of watershed. Generally, numbers exceeding 1.5 miles per square mile are considered less than optimal for elk.

³ Habitat effectiveness for forage calculated only for BLM-administered lands. Higher numbers reflect improved forage conditions.

⁴ Habitat effectiveness for cover calculated only for BLM-administered lands. Higher numbers reflect improved cover conditions.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base.

Dominant Woodpeckers

Dominant woodpeckers within the planning area include the hairy woodpecker, downy woodpecker, pileated woodpecker, northern flicker and red-breasted sapsucker. SEIS special attention species are discussed in a subsequent section of this chapter. All of the dominant woodpecker species depend on excavating nest cavities in dead trees or live trees with dead tops or branches. The downy and pileated woodpeckers require nest snags in forested stands while the others may nest in snags in more open habitats. Impacts of the alternatives on these species depend on the management direction intended for specific land allocations (e.g., number, size and condition of snags and trees planned for retention) and the changes in condition of these snags over time.

Under all alternatives, lands not allocated to intensive or restricted timber management would be managed to create or retain adequate numbers of snags to provide for 100 percent of optimum populations over the long term.

Two levels of analysis were conducted to examine the impacts of the alternatives. First, for lands allocated to intensive or restricted timber management, the number of snags potentially available within stands for various timber harvest regimes was modeled over time (Marcot 1991). Secondly, for the entire landscape within the Salem District, the abundance of snags was estimated using age class distributions in order to estimate habitat potential for the dominant woodpeckers (Neitro et al. 1985).

On lands allocated to intensive and restricted timber harvest in alternatives no action, A, and B, only snags and unmerchantable green trees would be retained in regeneration harvest units. During the past decade, the no action alternative resulted in the retention of about one snag per acre on harvest units. These snags and culls would primarily benefit dominant woodpeckers that nest in open areas. However, many of these snags retained under the no action alternative are soft snags and likely will decay and fall down in the short term. Modeling indicated this management direction is not adequate to retain appropriate levels of snags needed by dominant woodpeckers. This direction would result in few or no nest sites available on these lands after 40 years.

On lands allocated to restricted timber management in alternative C there would be two general silvicultural practices: high and low green tree retention. Modeling (Marcot 1991) indicates that both regimes

are able to maintain snag numbers over time to maintain at least 60 percent population levels for most species. Pileated woodpeckers, however, prefer larger patches of dense older forest for nesting. Thus habitat may be very limited for this species in the long term.

On lands allocated to intensive and restricted timber harvest in alternatives D and E, approximately five hard snags and green trees per acre would be retained after regeneration harvest. Modeling indicates this level should maintain nesting sites for at least 60 percent of optimum population levels for most species except pileated woodpeckers. However, some of the residual green trees may have to be killed by girdling and other methods to provide for snags in the long term. If this is not accomplished, 60 percent levels may not be achievable.

Under the proposed resource management plan, green tree retention requirements in the General Forest Management Area would be adequate to provide at least 60 percent of optimum population levels in the long term. However, some green trees reserved for snag recruitment may have to be killed or topped to provide snags.

Snag densities were estimated for BLM-administered lands at the landscape level using procedures outlined in appendix A. Densities were estimated for 10 and 100-year intervals. Anticipated snag density levels within various age classes under the various alternatives were used in this analysis. Snag densities were then related to population levels of woodpeckers by the use of a model developed by Thomas (1979) and further developed by Neitro et al. (1985). In this analysis, three snags per acre corresponds to 100 percent population levels, 1.8 for 60 percent levels, and 1.2 for 40 percent levels. Because the model has not been validated, its predictive capability is uncertain.

In the short term, all alternatives would likely maintain current populations (40 percent of optimum levels) of dominant woodpeckers due to the scarcity of suitable habitat (see table 4-7). In the long term, population levels of dominant woodpeckers are expected to decrease or remain at current low levels under alternatives no action, A, and B. However, population levels should equal or exceed 60 percent levels under alternatives C through E and be substantially exceeded under the proposed resource management plan.

Cumulative effects of the alternatives plus actions on other lands in the planning area are expected to maintain low snag abundance and cavity-user

Table 4-7 Estimated Percent of Optimum Potential Population Levels of Dominant Woodpeckers

	Alternatives						
	NA	A	B	C	D	E	PRMP
Short Term	40	40	40	40	40	40	40
Long Term	40	40	40	60	60	60	greater than 60

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base.

populations in the short term. Few large trees are left on private lands clearcut in the last 30 years except in state-mandated buffer strips. This situation will likely continue in the foreseeable future. Wildlife trees retained on BLM-administered lands and other public lands frequently comprise the majority of snag and large green tree habitat available for cavity-dwellers within an area of mixed public and private ownership.

Effects on the following priority species are displayed in table 4-8.

Accipiter Hawks

Effects on northern goshawks are discussed in a subsequent section of this chapter. Cooper's and sharp-shinned hawks prefer dense, unthinned stands for nesting (Reynolds 1983), primarily in the mid and late seral stages (20 to 90 years old). Thinnings in these stages can have adverse impacts on accipiters. The amount of thinnings expected under each alternative in the short term is shown in table 4-9. Impacts of thinning are expected to be highest under alternatives A, B, and C; intermediate under the proposed resource management plan and no action alternative; and least under alternatives D and E. However, thinning activities under the proposed resource management plan are expected to subside over time as old-growth characteristics are attained.

Numbers of Cooper's and sharp-shinned hawks would vary in accordance with the availability of unthinned habitat on BLM-administered and adjacent lands within the planning area. The amount of thinnings on adjacent (mostly private) lands are expected to be at least comparable to current levels on BLM-

administered lands under all alternatives. The cumulative effects of thinning on BLM-administered and private lands would adversely affect the amount of accipiter habitat and accipiter populations. Cumulative effects on northern goshawks would be more detrimental under alternatives no action, A, B, and C. They would be less detrimental under alternatives D and E, and the proposed resource management plan. This is due to greater retention of existing older forest and greater allowance for future stands to develop to older forest conditions on BLM-administered lands. Additional habitat would also be available on adjacent Forest Service land due to recent spotted owl decisions. Little habitat is anticipated on private lands.

Golden Eagle

The abundance of golden eagles in western Oregon appears to be related to the availability of early seral stages as foraging sites and mature/old-growth timber as nesting habitat. The golden eagle is a fairly adaptable species and apparently can nest in small blocks of appropriate habitat (Anderson 1989). In the short and long term, alternatives C through E, and the proposed resource management plan would likely result in maintenance of current levels of golden eagles. This is because present populations do not appear to be restricted by nesting cover due to their adaptability. Foraging sites would likely be available on adjacent private lands even under alternatives C through E, and the proposed resource management plan. Alternatives no action, A, and B would likely cause decreased abundance due to elimination of older forest stands.

Table 4-8 Estimated Effects of Alternatives on Other Priority Wildlife Species

Species ¹	Short Term/ Long Term	Alternatives						
		NA	A	B	C	D	E	PRMP
Accipiter hawks ²	ST, LT	0	0	0	-	+	+	+
Golden eagle	ST, LT	-	-	-	0	0	0	0
Great blue heron	ST, LT	-	-	-	+	+	+	0/+ ³
Osprey	ST	0	-	-	0	+	+	0
	LT	-	-	-	0	+	+	+
Black bear	ST, LT	0	0	0	-	-	-	0
Black-tailed deer	ST	0	0	0	0	0	0	0
	LT	0	0	0	0	+	+	+
Mountain lion	ST	0	0	0	0	0	0	0
	LT	0	0	0	0	+	+	+

Impacts: 0 = none or negligible; - = negative; + = positive.

¹ Effects on upland gamebirds and neotropical migrants would vary by species. See chapter 4, Wildlife section.

² Excluding northern goshawks which are described in chapter 4, Special Status and SEIS Special Attention Species and Habitat section.

³ No effect in short term, and positive effects in long term.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District resource specialists.

Table 4-9 Impacts on Cooper's and Sharp-shinned Hawks

	Alternatives						
	NA	A	B	C	D	E	PRMP
Thinned stands (average annual acres)	3,100	4,500	4,000	3,800	1,900	2,200	3,600
Impacts	-	-	-	-	-	-	-

Impacts: - = negative

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base.

The cumulative effect of alternatives no action, A, and B and activities on non-BLM-administered lands would likely cause reduced numbers of golden eagles. Numbers comparable to existing levels might be anticipated under other alternatives.

Great Blue Heron

Great blue heron abundance is related to the availability of suitable nesting habitat and prey base in riparian areas and mature/old-growth forests. In the short and long term, numbers of great blue herons are expected to decrease under alternatives no action, A, and B. This is because intensive timber management practices would cause a lower availability of nesting habitat. Conversely, numbers of herons would be expected to increase under alternatives C through E, and the proposed resource management plan in the long term due to increased availability of suitable nesting habitat.

Riparian habitat on private lands currently receives less protection than on federal lands. In addition, very little mature/old-growth habitat remains on private lands. Existing great blue heron rookeries are protected to some degree on state and private lands, but there is little allowance for maintenance of potential nesting habitat. The cumulative effect of alternatives no action, A, and B and activities on nonBLM lands would reduce the number of herons. More herons would be expected under alternatives C through E, and the proposed resource management plan.

Neotropical Migrant Birds

There has been increasing concern in recent years about apparent widespread population declines of neotropical migratory bird species which migrate between Central/South America/Mexico and North America (French 1991). Causes of the declines are unknown, but possible reasons include loss of habitat on the breeding or wintering ranges, pesticide use, or other factors.

There are an estimated 87 species of neotropical migrants that occur within the planning area. About 27 species are associated with early-seral coniferous forest stages; 26 with mid to late seral stages; 27 with mature conifer forest; 27 with hardwood forests; and 55 with riparian areas (Andelman and Stock 1993).

Based on analysis of neotropical bird population trends in Washington state (Andelman and Stock 1993), species with suspected declining trends in the planning area include: killdeer, band-tailed pigeon, rufous hummingbird, barn swallow, golden-crowned

kinglet, solitary vireo, orange-crowned warbler, yellow warbler, Wilson's warbler, chipping sparrow, song sparrow, and pine siskin. Some neotropical species indicate stable or increasing trends, while for many other species, trends are unknown (Andelman and Stock 1993).

Based on habitat affinities of neotropical migrants, alternatives no action, A, and B would provide more early-seral stage habitat and would favor 27 species of neotropical migrants (Andelman and Stock 1993). However, these alternatives would remove large acreages of conifer overstory which would have an adverse effect on 26 species associated with mid to late seral stages and 27 associated with mature stages. Of those associated with mature stages, it appears that the band-tailed pigeon, Vaux's swift, Hammond's flycatcher, Swainson's thrush, black-throated gray warbler, Townsend's warbler, and hermit warbler would be the species which would be most impacted. Hermit warblers and Vaux's swifts are of special significance, since their breeding range is confined to conifer forests in the Pacific Northwest. In the short and long term, the proposed resource management plan followed by alternatives E, D, and C would favor 27 species associated with mature conifer forest. Fifty-five species of neotropical migrants would likely benefit from progressively greater riparian protection under alternatives C, D, E, and the proposed resource management plan. These species would have less habitat under alternatives no action, A, and B. In the short and long term, species associated with hardwoods would likely have greater amounts of hardwood habitat under alternatives C through E, and the proposed resource management plan compared to alternatives no action, A, and B.

Of particular concern with this group of species is the cumulative effects of the alternatives in conjunction with the recent large-scale habitat changes created by federal and private timber harvest and land development in the Pacific Northwest along with habitat loss and pesticide use on the wintering grounds. It is quite likely that several of these species have experienced substantial population declines in the past few decades and are more vulnerable to future habitat changes. Long-term monitoring and inventories are lacking in the western United States. However, no major declines have been conclusively documented.

Osprey

Osprey abundance is most dependent on the availability of snags for nesting habitat and prey base near reservoirs, lakes, and major rivers and streams.

Although ospreys frequently nest in riparian areas, they also may nest in upland areas in proximity to large bodies of water. For example, approximately 10 percent of the ospreys along the Umpqua River nest in upland areas (Witt 1991). Upland areas would likely be affected by intensive timber harvesting to a greater degree than riparian areas which receive varying protection under all alternatives. However, the effect of intensive timber harvesting in upland areas can be reduced by leaving large broken-topped wildlife trees after timber harvest. In the short term, the current number of ospreys is expected to be maintained under alternatives no action and C; decrease under alternatives A and B; and increase under alternatives D, E, and the proposed resource management plan (see table 4-8). In the long term, alternatives D, E, and the proposed resource management plan should increase osprey numbers in contrast to other alternatives. Ospreys respond positively to the installation of artificial nesting structures which may be attached at the apex of topped trees (Witt 1990) and the maintenance of large, old wildlife trees.

The cumulative effect of alternatives no action, A, and B and actions on adjacent ownerships would likely result in fewer ospreys or numbers comparable to existing levels. Greater numbers of ospreys might be anticipated under other alternatives.

Amphibians

Refer to the Special Status and SEIS Special Attention Animal Species and Habitat section in this chapter for effects analysis of individual species. The abundance and diversity of amphibians is related to the availability of stable, undisturbed riparian habitat along streams, ponds and talus and dead and downed woody debris which help retain moisture. Water quality is also an important factor (Nussbaum et al. 1983). The limiting factor for many amphibian species is the availability of water and moist substrates on land for breeding (Nussbaum et al. 1983). The quality and quantity of riparian zones under the various alternatives is a major factor in the quality of habitat for amphibians. In the short term, more amphibians would be expected under alternatives B through E, and the proposed resource management plan compared to alternatives no action and A. This is due to increased protection and improved condition of riparian habitats (see impact section for riparian zones). Also, alternatives C through E, and the proposed resource management plan would provide increasing protection of upslope habitat including small, headwater streams apparently important to species such as the Olympic salamander and tailed

frog (Nussbaum et al. 1983). The proposed resource management plan would provide the best distribution of this habitat. In the long term, riparian habitat conditions would improve with progressively increasing protection under alternatives B through E, and the proposed resource management plan as the streamside vegetation is allowed to grow toward a mature, stable, undisturbed condition.

Cumulative effects of the alternatives and actions on other lands in the planning area would likely improve the condition of amphibians in the long term. This would occur as riparian habitat grows into more stable, mature forests on federal lands and as Oregon Forest Practice Act rules improve habitat on private land relative to the past few decades. However, regional impacts unrelated to forest land management (e.g., ozone thinning) are also concerns for these species.

Black Bear

Black bears are omnivores and forage heavily on fruit, green forage, and tree cambium. Such foods tend to be more prevalent in younger seral stages. However, Noble et al. (1990) recently pointed out that since black bears use large rootwads as den sites, they should also benefit from areas of mature forests. The authors further stated that policies which protect snags and dead and downed woody material should improve bear habitat. Thus, moderate to high populations of bear would be anticipated in areas with a good mixture of younger seral stages for food and mature stands for denning habitat.

In the short and long term, alternatives no action, A, and B would maintain moderate to high populations of black bear. Alternatives C through E, and the proposed resource management plan would likely maintain existing population levels in the short term; in the long term reduced availability of food materials on BLM-administered lands may reduce populations, but this could be compensated by adequate forage on adjacent nonfederal lands. However, denning habitat is expected to increase under alternatives C through E, and the proposed resource management plan. Cumulative effects would follow a similar pattern for all alternatives.

Black-tailed Deer

There is a large population of black-tailed deer in the Salem District. Habitat conditions would not change significantly during the next decade. Thus, in the

short term, the abundance of black-tailed deer would be roughly comparable under all alternatives. In the long term, under alternatives no action, A, B, and C, populations of black-tailed deer would probably be comparable to existing levels. Under alternatives D, E, and the proposed resource management plan, more optimal thermal cover would be available in the long term compared to other alternatives. The availability of this thermal cover when intermixed with forage in natural canopy gaps and in adjacent private lands could increase deer numbers in the long term. Availability of abundant forage without adequate interspersed cover is less desirable for deer.

Cumulative effects of alternatives no action, A, and B on BLM-administered lands and actions on other lands could result in localized boom-and-bust phenomena. This is because of anticipated high harvest levels and short harvest rotations on some adjacent lands along with harvest levels proposed for BLM-administered lands under these alternatives. The boom-and-bust phenomenon causes fluctuating deer numbers. These numbers respond to the cyclical levels of forest harvest caused by even-aged management of timberlands in western Oregon (Brown 1985). This phenomenon is characterized by an initial high abundance of forage in response to overstory canopy removal, followed by low production of forage due to increasing shade from the overstory canopy. Deer populations tend to increase during periods of high browse availability then decrease when forage is scarce. These short rotations are expected to continue in the future as timber companies respond to market demand. Cumulatively, more stable deer populations would be anticipated under alternatives D, E, and the proposed resource management plan than under alternatives no action, A, B, and C.

Mountain Lion

Mountain lion numbers are apparently dependent upon the abundance of deer since deer are their major food item. Therefore, alternatives which benefit black-tailed deer habitat should at least maintain or increase mountain lion numbers in western Oregon (Oregon Department of Fish and Wildlife 1987). In the short term, mountain lion populations are expected to remain comparable to existing levels. In the long term, mountain lion numbers would be expected to be correlated with deer numbers. Cumulative effects would follow a similar pattern for all alternatives.

Upland Game Birds

The habitat used by upland game birds listed as priority species in chapter 3 would be affected differently based on the specific habitat needs of each species. Wild turkeys would experience minor effects under all alternatives based on their current limited distribution and abundance within the planning area. Mountain quail are addressed in the Special Status and SEIS Special Attention Species and Habitat section. California quail are found at low elevations largely away from BLM-administered lands and are expected to be little affected by the various alternatives. Ruffed grouse prefer hardwoods often in riparian areas. Their habitat is expected to be somewhat more abundant compared to the existing situation under all alternatives except no action, A, and B where intensive timber management including stand conversion could reduce habitat. Blue grouse use openings for nesting and mature forest cover in winter roosting. All alternatives, except no action and A, are expected to maintain an adequate mix for this species. The band-tailed pigeon also uses openings for forage and mature forest cover for roosting; so a mixture of these habitats would be beneficial. In addition, the species uses mineral springs largely unaffected by forest management. All alternatives, except no action and A, are expected to provide adequate habitat conditions for this species (adequate forage is anticipated on nonfederal lands to compensate for a potential scarcity of forage on federal lands under alternatives C through E, and the proposed resource management plan in the long term). Mourning doves use early seral stages and riparian areas. Alternatives with greater protection of riparian areas (C, D, E, and the proposed resource management plan) are expected to benefit this species. Adequate early seral stage habitat is expected under alternatives no action, A, and B; as well as other alternatives where adjacent private lands are expected to provide adequate habitat for this species.

Effects on Fish Habitat

Management of vegetation in a drainage basin primarily determines the quality of the fish habitat. Vegetation controls the movement of water through the basin, maintains water quality, stabilizes upslope and channel areas, and provides structural material for the stream channel. The headwater first and second order streams, which account for 70 percent of the total stream miles in the district, are the most geologically active part of the stream system, and are important in determining downstream water quality. Timber management activities, which change the forest successional age, have both a short and long-term impact on the aquatic system.

Initial harvesting of timber in a basin usually has little or no impacts on fish production potential in the basin. As a greater percentage of the basin is harvested within a relatively short period of time, fish habitat may decline, sometimes quite rapidly, with impacts cumulative and extending downstream due to changes in hydrology, reduced water quality, and loss of large woody material. Retention of riparian communities and the use of best management practices for constructing roads and landings and protecting potentially unstable areas, may mitigate most potential habitat losses.

Large woody debris provided by the riparian area appears to be the most important single component controlling fish habitat conditions and salmonid populations (Bisson et al. 1987, Brown 1985). Partial or total removal of large woody debris sources usually creates a reduction of pool and off-channel habitat and fish populations (Andrus et al. 1988, Bilby and Ward 1989, Crispin et al., in press, Heifetz et al. 1986, House and Crispin 1990, House et al. 1989, House and Boehne 1987, House et al. 1991). The input of large woody debris is a major link between terrestrial and aquatic ecosystems (Lienkaemper and Swanson 1987). A basic assumption in evaluating the quality of riparian vegetation is that mature riparian zones dominated by large conifers maintain or enhance stream channel conditions. Downed large trees provide instream habitat for fish by creating pools and backwater areas. They also improve water quality by trapping sediments and slowing high flows.

Sedell et al. (1988) showed that the number of downed trees and pieces of large woody debris varied with stand age of riparian zones. Streams flowing through young-growth forests and recently harvested areas contained from one-fifth to one-

twentieth the number of large woody debris pieces found in streams in mature forests. The width of a riparian protection area determines the potential amount of large woody debris in a channel. A 94-foot width is capable of providing most of the necessary large woody debris (Murphy and Koski 1989). A 164-foot width is capable of providing an optimum amount of large woody debris (Van Sickle and Gregory 1990).

Fish habitat conditions in stream segments with adjacent BLM-administered lands are currently improving. This trend is expected to continue in the short term for all alternatives, but the rate of improvement will be slow because most riparian areas are in early successional stages and are dominated by deciduous trees. Full recovery of fish habitat potential depends on substantial conversion to conifers and the maturation of these conifers to mature size large enough to remain stable in the stream channel over time.

For the streams included in a particular alternative, recovery depends on the width of the riparian management areas or Riparian Reserves. The length of time needed for recovery varies by the type of existing vegetation. The normal succession is a gradual change from shrubs, hardwoods and young conifers to large conifers. Active management of riparian areas can accelerate the process of riparian recovery to stands of predominantly large conifers. These large trees would provide most of the large woody debris required for achieving optimum stream conditions.

Under all alternatives, stream improvement and riparian conversion projects are proposed that would speed the recovery of the productive potential in the improved streams. Monitoring of existing habitat improvements show they can provide optimum habitat equivalent to unaltered streams. The projects would be undertaken only to mitigate existing problems in the short term, and would not be a substitute for restoring and maintaining stream channels and riparian areas. Natural habitat has a much greater longevity than projects that last an average of ten years.

The proposed resource management plan, which incorporates the Aquatic Conservation Strategy objectives of the SEIS record of decision, provides the greatest protection of fish habitat. Compared to most other alternatives, the proposed resource management plan provides wide Riparian Reserves and more protective measures for perennial and intermittent streams. Although watershed analysis can result in reduced Riparian Reserve widths for intermittent streams (dependent on an analysis of

existing conditions in watersheds), this would only take place if warranted based on best information in the analysis process. By including greater protection of intermittent streams, the proposed resource management plan will thus provide for greater overall watershed protection of upslope, riparian, and downstream areas than in other alternatives. This will help stabilize hydrologic function, water quality, and in time large woody debris recruitment within the drainage. This is important because the cumulative effects of management actions on fish habitat over entire watersheds may be more critical than effects on any single component of fish habitat. Because of the uncertainty of funding for watershed restoration and the activities on non-public lands, it is not possible to estimate how much the production potential will increase through watershed restoration.

In the long term, aquatic habitat will continue to recover under all alternatives except A. Based on information in the SEIS, recovery will occur more rapidly under the proposed resource management plan than under the other alternatives due to greater upslope reserves and wider Riparian Reserves, particularly in headwater streams. Even if changes in land management practices and comprehensive restoration are initiated, no option may completely recover all aquatic systems within the next 100 years.

While the actual production of fish from streams on public lands is strongly impacted by actions outside the planning area, particularly the harvest of anadromous salmonids, productive capability is directly correlated with quality of habitat. As habitat improves, the productive potential of the habitat for fish also improves. Recovery depends on regrowth of conifers in and adjacent to the riparian area to mature age classes so that large conifer trees are available to fall into the stream and create fish habitat. Because of the length of time needed for riparian vegetation recovery, natural recovery, which relies on creation of large conifer trees to produce large woody debris, will produce little change in the first decade. The potential productivity is similar for all alternatives in the short term, and is constant for alternative A in the long term. Productivity potential in third order and larger streams will increase for alternatives no action, B, C, D, E, and the proposed resource management plan. Refer to the Effects on Special Status and SEIS Special Attention Species and Habitat section of this chapter for effects on fish species/stocks.

Cumulative effects in regard to management of riparian habitat on private lands depend in part on guidelines of the Oregon Forest Practices Act. This act requires less retention of riparian vegetation and downed logs than is proposed under most alterna-

tives on BLM-administered lands. Large trees and large woody debris have been extensively removed from private lands and may not be replaced in the future. Therefore, a major cumulative effect of timber management in individual watersheds, especially those with large private holdings, may be an overall shortage of large woody debris and habitat for priority fish species over the long term.

Possible mineral exploration and development activities are not expected to impact aquatic habitat under the proposed resource management plan.

Withdrawal of most streams in the district from potential hydropower development by the Northwest Power Planning Council will allow continued migration and spawning by anadromous salmonids.

Under all alternatives except A and B, land tenure adjustments described in chapter 2 will permit increased control over important riparian and aquatic habitat, and increase the ability of the district to develop and implement aquatic habitat rehabilitation projects for anadromous and resident fish species.

Poaching of salmon and steelhead, particularly summer run chinook and steelhead and fall chinook, has been a major problem in some accessible areas. Closure of roads in riparian areas will reduce the threat to these fish.

Increased recreational development in some areas will increase access to spawning areas and the probability of disturbance and poaching of spawning fish. In most areas, recreation development will not have negative impacts on fish and will enhance fishing opportunities for resident and anadromous salmonids and other game species.

Effects on Special Status and SEIS Special Attention Species and Habitat

Introduction

Special status plant and animal species within the Salem District are listed and described in chapter 3. SEIS special attention species are listed in appendix F and some are described in chapter 3.

Common to all alternatives is the requirement to protect federally listed and proposed species as legally required under the Endangered Species Act. Under all alternatives, requirements of species and their habitat would be considered and actions to reduce threats and promote viability of the species would be implemented. This could result in increased abundance, distribution, and health of some populations. Management of other special status species differs under each alternative. This is based on such factors as the administrative category (i.e., federal candidate, bureau sensitive, bureau assessment or state-listed) of the species, the occurrence of these species on commercial or noncommercial forestland, and on Oregon and California or public domain lands, and the lack of certainty about what is needed to maintain the viability of many species. Many special status species occur in special habitats such as wetlands, talus, dry meadows or in riparian zones. The degree of protection afforded these habitats would vary under each alternative.

Special Status Plants and Habitat

Effects on special status plants and their habitats could result from a variety of activities which take place in the planning area in conjunction with management of other resources. Known populations of these plants are generally small in size and scattered. Activities which pose the greatest threat are associated with forest management, mineral development, and recreational development and activities. Forest management could alter or destroy habitats and populations through such activities as timber removal, precommercial thinning, mortality salvage, vegetation control, fertilization, road construction, and development of rock quarries. However, some shade-intoler-

ant species could benefit from forest management activities which open the canopy and increase light on the forest floor. Mineral development could destroy plants and alter habitats by activities such as mineral exploration, mineral removal, road construction and assessment work. Recreational development and associated activities, which occurs in areas that contain such plants, pose threats through development of roads, parking areas, interpretive facilities, campgrounds, hiking trails, and horse trails; and by activities such as dispersed camping, trampling, off-highway vehicle use, and vandalism. However, interpretive facilities could increase public awareness and sensitivity to native vegetation and ecosystems resulting in less damage to special status species and/or their habitat. Finally, the introduction of noxious weeds and other nonnative vegetation by human activities results in competition with native species for space and nutrients often to the detriment of the latter species.

The only federally listed/proposed plant species in the Salem District (i.e., *Sidalcea nelsoniana*) would not be adversely affected by any of the alternatives. Its habitat is protected by provisions of the Endangered Species Act. Effects on other special status species (federal candidate, state-listed, and bureau sensitive, bureau assessment) would vary by alternative. Table 4-10 lists special status plant species known to exist in the planning area and the anticipated effect of each alternative on the respective species.

Under alternative A, high adverse effects on special status plants would occur and could contribute to their listing. This is due to the following factors: narrow riparian buffers; no buffers around special habitats; no older forest protection; high levels of timber harvest; and a minimal number of special areas.

Under alternatives no action and B, harvest of timber stands and other activities associated with timber production would likely affect the quality and quantity of habitat required by other special status plants. For example, alternative B would provide relatively low protection for special habitats which support populations of *Corydalis aqua-gelidae*, *Aster gormanii*, *Erythronium elegans*, and *Anemone oregana* var. *felix* in the Salem District. However, some of these plants grow in protected special areas such as areas of critical environmental concern.

Alternatives C through E, and the proposed resource management plan, generally in order of increasing protection, would enhance the quality or quantity of riparian and special habitats. This would result from

Table 4-10 Estimated Short-Term Effects of Alternatives on Special Status Plants and Fungi

Species	Alternatives						
	NA	A	B	C	D	E	PRMP
<i>Sidalcea nelsoniana</i>	+	+	+	+	+	+	+
<i>Corydalis aqua-gelidae</i>	-	--	-	+	+	+	++
<i>Aster gormanii</i>	-	--	-	+	+	+	+
<i>Erythronium elegans</i> ¹	-	--	-	+	+	+	+
<i>Cimicifuga elata</i>	-	--	-	+	+	+	++
<i>Dodecatheon austrofrigidum</i> ¹	-	--	-	+	+	+	+
<i>Filipendula occidentalis</i> ¹	-	--	-	+	+	+	+
<i>Oxyporus nobilissimus</i>	-	--	-	+	+	+	++
<i>Anemone oregana</i> var. <i>felix</i>	-	--	-	+	+	+	++
<i>Lycopodiella inundata</i>	-	--	-	+	+	+	++
<i>Huperzia occidentalis</i>	-	--	-	+	+	+	++
<i>Fritillaria camschatcensis</i> ¹	-	--	-	+	+	+	+

Impacts: + = positive effect; - = negative effect

¹ Because these species have extremely restricted ranges and few populations, any activity which would have an adverse impact on one of their populations could place the continued existence of the species at risk.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District resource specialists.

additional protection provided from widening of buffer zones and by increasing amounts of land allocated as old-growth reserves.

Species, such as *Cimicifuga elata* which inhabits moist forested sites, *Corydalis aqua-gelidae* which grows in still, cool mountain seeps, *Dodecatheon austrofrigidum* and *Filipendula occidentalis* which prefer moist rocky surfaces, *Anemone oregana* var. *felix* which is found in boggy areas with high water tables, and *Lycopodiella inundata* (synonym *Lycopodium inundatum*) and *Huperzia occidentalis* (synonym *Lycopodium selago*) which grow in high humidity habitats, would receive greater protection under alternatives C through E, and the proposed resource management plan (in order of increasing protection) due to additional riparian protection provided by these alternatives.

Oxyporus nobilissimus, which grows in old-growth noble fir trees, snags, and stumps, would receive greatest protection under the proposed resource management plan which tiers to the SEIS record of decision and includes 600-acre reserves around locations of this species until the sites can be thoroughly surveyed and site-specific measures prescribed. Alternatives C through E would provide

greater protection to this species than no action, A, and B because of greater protection of older-forest habitats.

Aster gormanii which grows on rocky ridges would receive greater protection under alternatives C through E, and the proposed resource management plan (with the proposed resource management plan providing the most protection) compared to other alternatives due to increased protection of forests in reserves. Populations of special status species growing in areas of critical environmental concern (e.g., *Erythronium elegans*, *Fritillaria camschatcensis*, *Anemone oregana* var. *felix*, and *Cimicifuga elata*) or proposed areas of critical environmental concern would benefit from alternatives C through E, and the proposed resource management plan as more areas of critical environmental concern would be designated.

Under all alternatives, other special status plants (excluding listed and proposed species) and their habitats could be adversely affected on lands managed for intensive production of timber and other intensive activities such as recreational development and activities, and mining. However, BLM would determine whether a proposed action would contrib-

ute to the listing of affected species prior to the action. If an action was determined to contribute to listing, the action would be modified.

Very little protection is provided to special status plants on private lands. However, on adjacent national forest lands, threatened and endangered plants are managed according to provisions under the Endangered Species Act and agency policy similar to BLM. Modeling to determine minimum viable populations and extinction probability has not been conducted for special status plants in the planning area. Therefore, the number of separate populations needed to maintain viable species has yet to be determined.

SEIS Special Attention Plant and Fungi Species and Habitat

The analysis of impacts of the proposed resource management plan also incorporates by reference the conclusions in appendix J2 of the SEIS regarding: nonvascular plants (bryophytes, lichens), vascular plants, and fungi. In summary, the SEIS concluded that its alternative 9 (which was essentially adopted in the resource management plan) would have the following consequences:

Bryophytes

Alternative 9 affords fairly high protection to bryophytes in the form of survey and manage measures. After application of these measures under alternative 9, only three species remained of concern and no SEIS alternative would remove these concerns. The status of these three species (*Tritomaria exsectiformis*, *Marsupella emarginata* var. *aquatica*, and *Diplophyllum plicatum*) on BLM-administered lands in the Salem District is currently unknown.

Lichens

Likewise, survey and manage measures for lichens under alternative 9 do not remove, but substantially reduce, the risk of extirpation of particular lichen species. The occurrence of many of the rare and endemic species on BLM-administered lands in the Salem District is not well substantiated. Some risk may also remain due to cumulative effects due to activities on nonfederal land related to short-rotation timber harvesting and road building, and effects unrelated to forest harvest activities such as global concerns (e.g., acid precipitation).

Vascular Plants

Despite the survey and manage measures incorporated into alternative 9, five species (*Abies lasiocarpa*, *Bensoniella oregona*, *Coptis asplenifolia*, *Cypripedium fasciculatum*, and *Cypripedium montanum*) of vascular plants are still of concern generally because of limited distribution or rarity on federal lands. However, none of these are known to occur on BLM-administered lands in the Salem District.

Fungi

Survey and manage measures under alternative 9 alleviate original concerns about many fungus species, but some risk of species extirpation remains, particularly for 115 rare and endemic species. Surveys for fungi on BLM-administered lands in the Salem District are not adequate at this time to fully gauge the effects of the proposed resource management plan on these species.

Early Successional Species

Species that find optimum habitat in early successional forests will likely be maintained under alternative 9, due to the conclusion that the amount of these forests on the landscape within the range of the northern spotted owl is probably greater now than at any time in the past. According to the SEIS, "In general, species associated with early successional conditions are good dispersers, have high reproductive rates, and are able to persist in small patches of habitat that result from small-scale disturbance." (Hunter 1990, Smith 1966).

Special Status Animal Species and Habitat (peregrine falcon, spotted owl, bald eagle and marbled murrelet)

Peregrine Falcon

None of the alternatives are expected to have short-term or long-term impacts on this species. No peregrine falcons are known to nest on BLM-administered lands in the planning area. In addition, potential peregrine falcon habitat is very limited on the Salem District.

Spotted Owl

Information on the habitat and populations of the northern spotted owl is discussed in chapters 3 and 4 of the SEIS. The discussion in this proposed resource management plan incorporates the SEIS by reference and further supplements SEIS information by subsequent discussions specific to the Salem District planning area.

Within the planning area, the primary land management activity affecting spotted owl habitat is timber management. Timber harvest may affect habitat suitability by removing stands of trees under a regeneration harvest prescription or it may be used for the long-term benefit of habitat through selective cutting (thinning) of individual trees to promote tree growth and habitat diversification.

Other BLM-conducted or BLM-authorized activities which could affect spotted owls or their habitat include road construction or other activities which remove or alter coniferous forests; blasting or other types of activity generating loud noise which could disturb nesting and ultimately reproductive success; granting of rights-of-way or road use permits which could lead to habitat loss on federal and nonfederal lands; mining; and land exchanges which transfer habitat to other ownership which would then be subject to timber harvest, land development, or other activity contributing to habitat loss. Conversely, land exchanges could transfer suitable habitat to federal ownership to be managed for the conservation of the species, particularly where the transfer would block up federal ownership.

Effects on Suitable Habitat

Aerial photography and timber inventory data were used to evaluate the BLM-administered forest stands in the planning area. Based on habitat information in the Interagency Scientific Committee report (Thomas et al. 1990), two categories of suitable spotted owl habitat were identified.

Habitat 1. Comprised of coniferous forest stands that satisfy the full complement of daily and annual needs of the owl for nesting, roosting and foraging. These stands have a multi-layered canopy of several species of coniferous trees with large trees in the overstory and an understory of shade tolerant conifers and hardwoods. The canopy closure exceeds 70 percent. There is a significant measure of decadence in the stands resulting from the occurrence of snags and broken-topped live trees along with dwarf

mistletoe infections. The forest floor has substantial accumulations of large down woody material in the form of fallen trees.

Habitat 2. Comprised of coniferous forest stands, and some hardwood stands which provide roosting and foraging opportunities for spotted owls, but lack the necessary structure for consistent nesting. The roosting and foraging qualities are less than those described for habitat 1 due to the reduced quality or complete absence of one or more of the components listed above (e.g., the absence of large trees in the overstory or a reduced amount of down woody material on the forest floor). Habitat 2 stands generally have less diversity in the vertical structure and have either limited or poorly defined multi-layered canopy structure. The understory is somewhat open, allowing for owl movement and foraging. Canopy closure generally exceeds 70 percent.

Currently there are about 50,000 acres of habitat 1 and 107,000 acres of habitat 2 for a total of approximately 157,000 acres of suitable habitat on BLM-administered lands within the planning area. There is a concern that large expanses of habitat 2, without any inclusions of habitat 1 to provide nesting groves, would not provide the same level of habitat suitability as if there were a mixture of the two habitat types. Within the planning area and under all alternatives, there would be interspersions of the two types of habitat due to riparian buffers, Timber Production Capability Classification nonsuitable lands, natural vegetation patterns, past harvest patterns, and other lands not available for timber management. Based on this assumption the two categories were combined for all analysis purposes.

Future habitat suitability was estimated by aging existing stands and projecting the location and timing of future harvests, using the ten-year timber management scenario for the short-term projections and random selection from lands available for harvest in each alternative for the longer-term projections. The effects of silvicultural prescriptions such as density management were also considered. A natural, disturbance-caused rate of habitat loss of 0.4 percent per decade was also included in the projection by random selection.

The projected development of future spotted owl habitat is shown in table 4-11. In estimating the rate of development of future habitat, forecasts were more conservative for habitat development on existing stands regenerated following timber harvest due to the current lack of large trees and snags and typical single-layered, evenly spaced, closed-canopy conditions.

Table 4-11 Stand Ages or Period After Regeneration Timber Harvest, When Spotted Owl Habitat is Attained

	Age or Period of Years
Unmanaged Stands ¹	
Naturally Established	70
Established by Even-Aged Harvest	100
Managed Stands	
Even-Aged (rotation 100 years or less)	N/A
Restoration and Retention Blocks (alternative C)	.2
More than 35 percent Basal Area Retention (alternative C)	50
15 to 20 percent Basal Area Retention (alternative C)	70
Late-Successional Reserves (proposed resource management plan)	.2
Connectivity Areas (proposed resource management plan)	70
General Forest Management Areas (proposed resource management plan)	N/A

¹ Also applies to existing stands managed under approaches designed to emphasize biological diversity.

² These stands initially would become habitat at the same age as unmanaged stands.

N/A = Not Applicable

Source: Estimates made by Salem District resource specialists.

Density management in the restoration and retention blocks in alternative C would probably not negatively affect attainment or retention of suitable habitat conditions. Such harvests could accelerate development of suitable habitat, but the success rate of such treatments is unknown at this time. Within the Late-Successional Reserves of the proposed resource management plan, harvest would occur only when the treatment would be judged to result in beneficial effects to spotted owl habitat. The intent of any prescriptions would be to accelerate the development of old-growth forest characteristics, which should also enhance spotted owl habitat.

The analysis assumed that in the future nonfederal lands would have no suitable habitat. This is a worst case scenario, but it is probably true for the vast majority of those lands as they will likely be managed on harvest rotations ranging from 50 to 80 years. These short rotations would yield little, if any, habitat capable of sustaining significant numbers of reproducing spotted owls.

Current acres of spotted owl habitat and future owl habitat projected for the district, by alternative, are shown in table 4-12. The data was stratified by spotted owl physiographic provinces. The planning area occurs within the Coast Range and Western Cascades provinces.

Since the no action alternative is not mapped in the BLM's Geographic Information System data base, habitat data could not be calculated, but the outcome would be similar to that of alternative B.

Effects on Suitable Habitat Within the Salem District

Habitat conditions for spotted owls would change over time under all alternatives. In the short term, suitable habitat would decline under all alternatives compared to the existing situation, but would vary by alternative in later decades. Under alternatives no action, A, and B, the amount of suitable habitat in the Coast Range and Western Cascades provinces would decline on BLM-administered lands throughout the first five decades. Then it would increase slightly by the tenth decade though at levels below the current situation. In the long term, these alternatives would provide low levels of suitable habitat in both the Coast Range and Western Cascade provinces. The amounts of suitable habitat provided long term by alternatives no action, A, and B would not be expected to maintain clusters of owl sites, produce consistent occupancy of sites, or provide sites with adequate amounts of suitable habitat. In the long term, spotted owl populations in Oregon would be dependent on habitat located on Forest Service lands for survival.

The proposed resource management plan followed by alternatives D, E, and C in decreasing, yet substantial, amounts would provide the greatest amounts of suitable habitat in the long term. However, only the proposed resource management plan and alternative D are specifically designed to provide areas where clusters of sites would be maintained.

Under the proposed resource management plan, approximately 15 percent of the BLM-administered forest lands within the planning area would be available for intensive timber management. Suitable habitat would dominate across the planning area with unsuitable habitat occurring only on the more scattered BLM-administered lands and in patches in the larger blocks of BLM ownership. The vast majority of suitable habitat would be unmanaged.

Alternatives D and E would provide approximately 61 and 53 percent, respectively, as much suitable habitat in the long term as the proposed resource management plan (see table 4-12). Under alternative D, approximately 41 percent of the suitable habitat would occur within the habitat conservation areas. Under the proposed resource management plan, 65 percent of the suitable habitat would occur in Late-Successional Reserves, and much of the intervening

area (42 percent) would be in Riparian Reserves. The proposed resource management plan would result in a lower degree of habitat fragmentation than under alternatives D, C, and E. Suitable habitat outside the habitat conservation areas would be more scattered and fragmented under alternative D than in alternatives C, E, and the proposed resource management plan.

Under alternative E, existing stands older than 150 years would be protected, thus maintaining the current, inadequate distribution of older forest in the district.

Under alternative C, suitable habitat levels decline through the first five decades followed by a long-term increase to a level similar to the current situation. In the long term, suitable habitat under alternative C would be distributed throughout the planning area. It is possible that larger blocks of suitable habitat would occur around the restoration and retention blocks or within the corridors, but there is no way to project precisely how the habitat would be distributed in the landscape. Approximately 61 percent of the land base under this alternative would be in managed forest stands, under either the high or low retention regimes.

Table 4-12 Suitable Spotted Owl Habitat by Alternative¹ (thousand acres)

		Alternatives					
	Current ²	A	B	C	D	E	PRMP
After 10 Years							
Coast Range Province	81	61	64	77	84	77	79
Western Cascades Province	76	62	66	75	73	74	71
Total	157	123	130	152	157	151	150
After 50 Years							
Coast Range Province	81	19	39	68	98	70	134
Western Cascades Province	76	16	36	44	61	69	77
Total	157	35	75	112	159	139	211
After 100 Years							
Coast Range Province	81	29	52	91	130	87	212
Western Cascades Province	76	22	46	61	69	85	115
Total	157	51	98	152	199	172	327

¹ The no action alternative is not mapped in BLM's Geographic Information System data base so habitat data could not be determined. However, the amount of habitat is expected to be similar to that of alternative B.

² Existing habitat includes 18,347 acres of habitat 1 in the Coast Range Province and 32,463 acres of habitat 1 in the Western Cascades Province.

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base.

In conclusion, all alternatives reduce the amount of suitable habitat available in the short term. The short-term habitat loss is most acute in alternatives no action, A, and B. Alternatives no action, A, and B would provide very little suitable habitat in the long term without large blocks of habitat to facilitate clusters of owl pairs. The proposed resource management plan would provide the highest level of habitat in the long term in a mosaic of both concentrated habitat blocks (i.e., Late-Successional Reserves) and Riparian Reserves which occur on lands between the habitat blocks. Alternatives D, E, and C would provide the next highest levels of suitable habitat in decreasing order of availability. Alternative D would concentrate more suitable habitat in large areas to minimize fragmentation, while alternatives C and E would distribute suitable habitat across the landscape.

Effects on Suitable Habitat Within Western Oregon

Effects on suitable habitat for western Oregon are shown in table 4-13. This includes data for all Forest Service and BLM-administered lands in western Oregon.

Based on the data in the *Final Draft Spotted Owl Recovery Plan* (U.S. Department of the Interior, Fish and Wildlife Service 1992a), BLM-administered lands currently provide approximately 14 percent of the suitable owl habitat in the region (Washington, Oregon, and northern California), compared with 74 percent on Forest Service lands. In Oregon, approximately 25 percent of suitable habitat occurs on BLM-administered lands; 70 percent on Forest Service lands.

The projections shown in table 4-13 indicate that in western Oregon, alternatives no action, A, and B would provide the least amount of suitable habitat in the short and long term. In the long term, alternatives no action, A, and B would result in 66 to 80 percent reductions in suitable habitat compared with habitat currently existing on BLM-administered lands. Compared to the amount projected for Forest Service lands, the BLM would not contribute substantial habitat for spotted owls in western Oregon under any of these three alternatives.

The proposed resource management plan would provide the greatest amount of suitable habitat in the long term, but would only be about 32 percent as much as is projected for Forest Service lands. Alternatives C, E, and D would contribute smaller acreage; 31, 28, and 22 percent of the Forest Service

projections, respectively. The actual percentages on BLM-administered lands in Oregon are higher than those calculated, since the Forest Service calculations include suitable habitat in the California portion of the Klamath Province.

The contribution of BLM-administered lands to the present and projected availability of suitable habitat in the different provinces varies substantially (see table 4-13). BLM-administered lands are most important in the Coast Range, where these lands currently contain more suitable habitat than Forest Service lands. Under alternatives no action, A, and B, suitable habitat on BLM-administered lands would be reduced 51 to 74 percent from current acres within the Coast Range Province, and would provide 15 to 27 percent as much suitable habitat as Forest Service land in the Coast Range in the long term.

In the long term, BLM-administered lands in the Coast Range under the proposed resource management plan would produce more suitable habitat than currently exists. Alternatives C, E, and D in the long term would produce 80, 62, and 58 percent of the suitable habitat in the Coast Range province compared to the proposed resource management plan. As shown in table 4-13, the relative contribution of BLM-administered lands to suitable spotted owl habitat in other provinces in the long term compared with Forest Service lands is smaller than in the Coast Range.

Effects on Dispersal Habitat

Habitats 1 and 2 provide for nesting, roosting, and foraging habitat and are concentrated in the habitat conservation areas under alternative D, and the Late-Successional Reserves of the proposed resource management plan. Also of importance is the condition of forest vegetation between the large blocks of suitable habitat as these areas serve as dispersal habitat for spotted owls. In the proposed resource management plan, the Riparian Reserves contribute significantly to dispersal habitat and may also provide an added measure of nesting, roosting, and foraging habitat. Provision of forest habitat to permit movement of juvenile and adult owls between nest habitat clusters is important to facilitate replacement of deceased individuals by recruits from the pool of dispersing young and nonterritorial adults (Thomas et al. 1990, U.S. Department of the Interior, Fish and Wildlife Service 1992a).

The Interagency Scientific Committee (Thomas et al. 1990) determined that under their proposed strategy, adequate dispersal habitat across the managed landscape was comprised of stands of high quality

Table 4-13 Suitable Spotted Owl Habitat on Forest Service Lands and on BLM-Administered Lands by Alternative (thousand acres)

Years ¹	Province	USFS ²	BLM-Administered Lands by Alternative					
			A	B	C	D	E	PRMP
10	Eastern Cascades	.3	12	13	14	14	19	18
	Klamath	-	79	85	314	328	348	339
	Western Cascades	-	198	210	262	260	277	263
	Coast Range	-	190	208	272	290	290	287
	Total	-	479	516	862	892	934	907
50	Eastern Cascades	-	1	6	22	9	36	16
	Klamath	-	55	129	297	315	483	409
	Western Cascades	-	38	96	178	236	320	297
	Coast Range	-	58	119	154	304	321	422
	Total	-	152	350	651	864	1160	1,144
100	Eastern Cascades	1,062	1	7	39	25	42	19
	Klamath	1,026	65	62	596	442	588	541
	Western Cascades	2,618	50	119	454	286	402	422
	Coast Range	554	82	151	558	402	431	694
	Total	5,260	198	339	1,647	1,155	1,463	1,676

¹ Data for current situation is shown below.

Province	USFS	BLM
Eastern Cascades	419	19
Klamath	421	354
Western Cascades	1,780	281
Coast Range	239	295
Total	2,859	949

² Estimated from unpublished data in final SEIS files.³ Data not available.

PRMP = Proposed Resource Management Plan

Source: Oregon State Office files.

old-growth forest located within riparian buffer strips, sensitive soil areas and other areas not available for timber management and other stands of mid and late-successional forest. In combination, these stands afford some level of security to nonterritorial owls as they exist in the landscape until they locate blocks of unoccupied suitable habitat and establish a territory.

The 50-11-40 rule was developed by the Interagency Scientific Committee to define a prescription for management of dispersal habitat under a strategy using large habitat blocks separated by distances of 8 to 12 miles (Thomas et al. 1990). The rule calls for maintaining at least 50 percent of the land outside nesting habitat clusters in a forested condition where stands have an average tree size of at least 11 inches

diameter at breast height and canopy closure of at least 40 percent. Although it is based on limited field data, the method has been used to assess dispersal habitat of spotted owls. Quarter townships (nine square miles) have been used as the scale to assess the 50-11-40 standard.

Effects on Dispersal Habitat Within the Salem District

Within the Salem District, there are currently patches of mid and late-successional stands (as well as some scattered old-growth stands) that do meet the dispersal habitat needs of spotted owls in most quarter townships. This would be the case in all alternatives, but alternatives no action, A, and B would result in the least amount of these habitat patches.

Alternatives no action, A, and B would likely result in most, if not all, of the quarter townships within the planning area not meeting the 50-11-40 rule in the long term. This is due to the large amount of acreage available for timber management and a 60-year harvest rotation. Under these alternatives, dispersal habitat would be attained in managed stands approximately 40 years after regeneration harvest, but most of these stands would be subject to harvest again in the subsequent 20 to 30 years. Under these alternatives, large blocks of suitable habitat would not be available for clusters of nesting owls. Owls in this landscape would need to disperse long distances between reserve areas such as wilderness areas and Late-Successional Reserves on Forest Service lands. The increased distances involved would be likely to have a negative effect on both the survival rates of dispersing owls and the percentage that establish territories and reproduce.

Dispersal habitat conditions would be substantially improved under alternative C, especially within the corridors where restoration and retention blocks and high retention silvicultural regimes would retain existing dispersal habitat and develop additional habitat. Outside the corridors the low retention regime would contribute to dispersal habitat in the long term as regenerating stands aged beyond 40 years. Overall, this alternative would probably meet or exceed the 50-11-40 rule in all quarter townships after five or six decades. As in the previous alternatives, dispersing owls would be moving greater distances between clusters of pair sites than in alternative D and the proposed resource management plan. Generally, the quality of the habitat owls would be dispersing through would also be better. It would not only meet the 11-40 criteria, but in many instances would also meet the criteria for habitat 1 or habitat 2. Some of the restoration and retention blocks under alternative C would be large enough to support reproductive pairs, but these would not be the large blocks called for in the final draft spotted owl recovery plan.

Alternative D portrays the Interagency Scientific Committee report recommendations and would require compliance with the 50-11-40 rule when planning timber harvest. The distance which owls would be required to disperse across the managed landscape would be much less under this alternative than any previously mentioned alternative due to the presence of the large category 1 and 2 habitat conservation areas. The large habitat conservation areas, along with the improved dispersal habitat conditions, would facilitate adequate dispersal as prescribed under the Interagency Scientific Committee conservation strategy.

Alternative E would protect stands 150 years and older, and adequate dispersal habitat should be available in the long term. However, due to the current age distribution in the planning area, less dispersal habitat would be provided under alternative E than in alternative D in the long term. Thus, dispersal habitat conditions would likely be less favorable for spotted owls under alternative E than under alternative D.

Under the proposed resource management plan, the reserve system is much more extensive than that originally proposed by the Interagency Scientific Committee or the Spotted Owl Recovery Team. This results in a smaller land area where dispersal habitat conditions would need to be considered and in some situations the reserves are much closer to each other than in alternative D thus reducing, or even eliminating, the concern for dispersal habitat. The Riparian Reserves, which are an important component in providing dispersal habitat, are significantly larger under the proposed resource management plan compared to other alternatives. This results in benefits to dispersal habitat conditions by reducing potential harvest unit sizes and the amount of total land available for harvest. The dispersal habitat conditions under the proposed resource management plan will be adequate in the short term and improve over time on a track similar to that of alternative D, and in the long term exceed the conditions projected under alternative D. As stated in the SEIS, "the elements of alternative 9 (the proposed resource management plan) should enhance the dispersal situation in the long term as habitat grows back in areas previously harvested, both in and outside of Late-Successional Reserves. It would also reduce concerns in the short term since the amount of habitat subject to harvest would be less especially in areas where dispersal may be a concern." In future planning and implementation of the proposed resource management plan, if there is a question of the adequacy of dispersal habitat conditions in a given locale, the BLM will informally consult with the U.S. Fish and Wildlife Service to evaluate the situation.

In conclusion, alternatives no action, A, and B would result in the least effective dispersal habitat conditions of all the alternatives. Alternatives C, D, E, and the proposed resource management plan would provide adequate dispersal habitat conditions in the long term, but alternatives C, D and the proposed resource management plan provide more total acres. Under alternative D and the proposed resource management plan, most quarter townships would be managed at the minimum level necessary to maintain or restore dispersal habitat on at least 50 percent of BLM-administered lands outside the reserves estab-

lished under alternative D. Both alternative D and the proposed resource management plan would follow the same pattern of habitat availability but the quality and quantity of dispersal habitat in the proposed resource management plan would ultimately exceed alternative D.

The BLM checkerboard pattern of ownership may yield cumulative dispersal habitat conditions that constitute less than 50 percent of the landscape. It is unknown if conditions in the checkerboard pattern under the proposed resource management plan will be sufficient to provide for successful dispersal of owls between suitable nesting areas. This situation was recognized by the Interagency Scientific Committee (Thomas et al. 1990) when they recommended that the 50-11-40 rule be prorated by ownership for the first three years and then be re-evaluated as it applies to multiple-ownership areas. The BLM will monitor habitat conditions and owl dispersal in an effort to provide insight into the adequacy of habitat conditions under the proposed resource management plan.

Effects on Critical Habitat

In 1992, the U.S. Fish and Wildlife Service designated 6.5 million acres as critical habitat for the northern spotted owl. The acres are arranged in 190 separate critical habitat units across the states of Washington, Oregon, and California. Critical habitat units in Oregon containing BLM-administered lands include: OR-10, 12, 14, 16, 20, 21, 22, 23, 24, 25, 27, 29, 31, 32, 34, 36, 37, 38, 39, 40, 41, 43, 44, 45, 46, 47, 48, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 72, 74, 75, and 76. These 48 critical habitat units total about 2.6 million acres of which about 1.1 million acres are administered by the BLM. Within the Salem District planning area, there are 12 critical habitat units comprising about 201,100 acres of BLM-administered lands. The following chart tabulates critical habitat unit acreages relative to the land allocations under the proposed resource management plan.

CHU #	Land Allocations ¹					
	C/DB	GFMA	LSR-1	AMA	LSR-2	CW
OR-10	73	138				
OR-12		2,011	5,794	17,050		5,794
OR-14	3,836	5,175	30,336			
OR-39				216	7,097	
OR-40				32		
OR-41				10	39,359	
OR-43			52	214		
OR-44			5,888	472	21,326	
OR-45				38	6,907	
OR-46			197			
OR-47		906	25,627			
OR-48			26,536			
Total						

- ¹ C/DB = Connectivity/Diversity Blocks
 GFMA = General Forest Management Areas
 LSR-1 = Late-Successional Reserves outside Adaptive Management Areas
 AMA = Adaptive Management Areas
 LSR-2 = Late-Successional Reserves within Adaptive Management Areas
 CW = Congressionally Withdrawn Lands

CHU = Critical Habitat Unit

Source: Western Oregon Digital Data Base.

All proposed actions that may affect lands designated as critical habitat would be consulted upon informally and, if necessary, formally with the U.S. Fish and Wildlife Service. For all alternatives, the BLM will not implement any action that the U.S. Fish and Wildlife Service determines through consultation would result in the destruction or adverse modification of critical habitat. A sensitivity analysis of the effects of excluding all timber management activities from designated critical habitat is shown in the Effects on Timber Resources section of this chapter.

Effects on Populations

This proposed resource management plan incorporates by reference the discussion and conclusions of the SEIS related to analysis of spotted owl population trends in appendix J3 and chapters 3 and 4, pages 3 and 4-212 to 237. An in-depth discussion of the significance and context of demographic studies in the conservation of the northern spotted owl is provided in the SEIS, pages 3 and 4-212 to 235. The following points summarize the key items from that discussion.

- The overall results of the demographic analysis in the SEIS indicate a declining trend in northern spotted owl numbers. These results were not unexpected since the demographic data was gathered during a time of habitat decline, which was the primary reason for the listing of the northern spotted owl as a threatened species.
- The results also indicated a declining rate in adult survivorship. It is not possible to know with certainty what specific actions could be implemented to reverse this declining rate. This information supports a relatively conservative plan for owls, but whether the demographic results of these studies call for any more measures than what are contemplated in the proposed resource management plan is not known. These data, however, would support a decision to adopt a markedly more conservative approach to spotted owl management in the proposed resource management plan (U.S. Department of the Interior, Fish and Wildlife Service 1992a, Thomas et al. 1990).
- Concerns were raised about whether the population of northern spotted owls could survive over the transition period until habitat recovery occurred. These were based largely on the finding of declining survival rates for adult female owls and the contention that the population may already have or is about to pass a threshold from which it cannot recover. In order for the spotted owl to be at or near such a threshold resulting in extirpation of the species from large parts of its range as a result of timber harvest under the proposed resource management plan, the following four conditions would have to be met:
 - owl populations would have to be declining throughout all or most of their range;
 - within the general areas where overall declines were seen, there would have to be no significant source areas that could provide for demographic rescue;
 - the factor, or factors, causing the decline would have to be operating in a similar fashion throughout all or most of the range; and
 - the decline would have to continue as a function of habitat conditions until owl population sizes and densities were reduced to the point that the populations could not recover.

There is additional discussion on each of these points in the SEIS. This discussion concluded that:

- While there is strong reason to believe that the owl populations have declined across much of their range, there is ample reason to believe that the

pattern of population change is not the same everywhere.

- There are areas within the range of the owl with characteristics thought to be important to the productivity and stability of local populations and that such areas could act as sources for the owl population even in the face of an overall decline. Many of these areas are within the Late-Successional Reserves designated by the proposed resource management plan.
- It is unlikely that a single factor, with the exception of habitat loss, is primarily responsible for the declines in the owl population across the range. With the full range of environmental heterogeneity represented within reserves, there is reason to believe that owl population performance will vary in both positive and negative ways throughout the range. Given this, it would be inappropriate to make a simple extrapolation from the current estimated rates of decline in the owl population to a single future projection of irreversible decline.
- There is no part of the demographic studies that link them to either historic or projected rates of decline and there is no other evidence that the owl population losses will accelerate in the future or no empirical or theoretical basis for believing that the current habitat condition or condition of the owl population represents a unique threshold point.

The draft resource management plan utilized a spatially explicit population model by McKelvey (1992) to evaluate the likely response of a model-generated owl population to a varying set of habitat situations characteristic of the range of alternatives. This model was subsequently used in the SEIS analysis. This proposed resource management plan incorporates the discussion of that application found in appendix J3 of the SEIS.

As stated in appendix J3, "Our results support the conclusions reached by Forest Ecosystem Management Assessment Team in assessing likelihood of habitat conditions to provide for stable and well-distributed populations (measured against the owl's historic range) on federal lands over both the short and long term." The authors also stated that "The Forest Ecosystem Management Assessment Team based their ratings on an assumption that the amount and distribution of habitat would be sufficient to support a large enough population of owls to prevent passing an extinction threshold. Our simulation results do not prove this assumption correct (nor could they), but they do lend support to it for alternatives 1 and 9 under the most likely rule sets." The standards and guidelines of the latter were embraced by the proposed resource management plan.

Conclusions

Analysis of the information on population levels and the quantity and arrangement of suitable habitat on the landscape indicated that the alternatives in this environmental impact statement would likely have different outcomes for sustaining owl populations on BLM-administered lands in western Oregon and contributing to the long-term stability (recovery) of populations within the range of the owl. For alternatives no action, A, and B, the outlook for sustaining owls on the BLM-administered lands is very low, thus virtually eliminating any contribution to the overall spotted owl population stability in the region. For alternatives C through E, and the proposed resource management plan, the likelihood of sustained populations on BLM-administered lands is greatly increased and there would be an important contribution to the overall spotted owl population stability in the region. The contribution to recovery associated with each alternative varies because of the amount and distribution of suitable habitat and/or the amount and distribution of dispersal habitat in the first several decades of implementation. The level of contribution to the recovery of the spotted owl for alternative D is about the same as implementation of the *Final Draft Recovery Plan for the Northern Spotted Owl* (U.S. Department of the Interior, Fish and Wildlife Service 1992a). On the other hand, the proposed resource management plan would provide a somewhat higher level of contribution to the recovery of the owl than the final draft recovery plan. The proposed resource management plan contribution as compared to alternative D, is greater due to the large increase in suitable habitat that occurs. In the long term the proposed resource management plan will exceed alternative D in the amount of suitable habitat and overall habitat capability. The lower expectation of contribution under alternative C results from the uncertainty that silviculture will be successful in recreating habitat over large portions of the landscape. Under alternative E, the allocations perpetuate the habitat conditions of today and do not afford opportunity for regrowth of habitat in areas presently deficient, thus resulting in a habitat area of lesser extent than alternatives C, D, and the proposed resource management plan.

Bald Eagle

Bald eagle sites (including five existing nest sites and three potential sites) identified under the Pacific bald eagle implementation plan (Washington Department of Wildlife 1989) would be protected under all alternatives. Assessment of effects on bald eagle habitat is therefore based on the number of potential habitat sites (i.e., in addition to those identified in the implementation plan) that would be available under each alternative.

In the short term, alternatives no action, A, and B would provide the fewest number of potential habitat sites. This is because they provide less protection for old-growth and mature forests and riparian zones. In contrast, alternatives C through E, and the proposed resource management plan would provide higher levels, based on increased protection of old-growth and mature habitat and riparian zones. Under all alternatives, bald eagle populations on BLM-administered lands would probably remain at current levels due to protection of all existing and some potential habitat.

In the long term, the availability of suitable bald eagle habitat would also depend on the amount of habitat allowed to regrow into old-growth and mature forest habitat and riparian zones. Alternatives C through E, and the proposed resource management plan would provide some of this habitat in the long term whereas alternatives no action, A, and B would provide very limited potential habitat. Bald eagle populations would likely increase in the long term under alternatives C through E, and the proposed resource management plan due to increased availability of mature and old-growth forest.

Cumulative effects of alternatives no action, A, and B and actions on other lands in the planning area would likely maintain current low levels of bald eagle habitat and populations. Bald eagle habitat and populations are not expected to increase from already low levels on private lands in the short and long term. Since additional older forest and riparian protection would be available under alternatives C through E, and the proposed resource management plan (assuming no change in bald eagle habitat on private lands), the cumulative effects would result only in slightly higher amounts of bald eagle habitat and populations within the planning area. From a western Oregon perspective, similar levels of habitat protection on other federal lands (e.g., national forests and other BLM districts) would tend to result in modest increases in bald eagle habitat and populations over time.

Marbled Murrelet

Assessment of impacts on marbled murrelet habitat focuses on the amount of suitable nesting habitat (120 years and older with light to moderate overstory) that would be available within 50 miles of the Pacific Coast in the short and long term. Table 4-14 displays, by alternative, the current estimated acres of suitable nesting habitat, the projected loss of habitat due to timber harvest over the first decade, and the acres of land that would be expected to provide nesting habitat in the long term.

In the short term, all alternatives would remove suitable nesting habitat. Impacts would be expected to be greater under alternatives no action, A, and B, and less under C through E, and the proposed resource management plan as a result of greater protection levels of older forests in the latter alternatives. All stands occupied by murrelets will be protected under the proposed resource management plan. In order to identify occupied stands, all action areas within 50 miles of the coast subject to degradation of suitable nesting habitat would be surveyed to determine the murrelet occupancy status. For all alternatives, protection would be afforded to known occupied murrelet sites under the provisions of the Endangered Species Act.

In the long term, the availability of suitable nesting habitat would depend on the amount of older forest protected and the amount that will grow into suitable nesting habitat condition. It would also be influenced by the success of developing old-growth characteristics through silviculture treatments which are planned under some alternatives, particularly alternative C. Alternatives C through E, and the proposed resource management plan would provide higher but variable levels of nesting habitat in the long term, compared to alternatives no action, A, and B which would provide very limited suitable nesting habitat. Based upon availability of nesting habitat, marbled murrelet populations would likely increase in the long term under alternatives C through E, and the proposed resource management plan due to the increased amounts of habitat.

The cumulative effects of alternatives no action, A, and B and the actions on other land ownerships would likely result in further declines in marbled murrelet populations due to the lower amounts of older forest having suitable nesting habitat conditions. Murrelet habitat and numbers of birds are not expected to increase from already low levels on private lands in the short or long term. Although additional

Table 4-14 Impacts on Marbled Murrelets

	Alternatives					
	A	B	C	D	E	PRMP
Proposed harvest in habitat during first decade	13,266	8,394	3,978	1,581	3,231	145
Impacts	---	--	--	--	--	--
Suitable habitat after 100 years	29,000	54,000	131,000	134,000	104,000	212,000

Current habitat = 28,054 acres

The no action alternative was not analyzed because a ten-year timber management scenario was not developed for this alternative. However, effects are expected to be similar to alternative B.

Impacts: - = negative; 0 = none or negligible; + = positive.

PRMP = Proposed Resource Management Plan

Sources: Salom District wildlife inventory and ten-year timber management scenarios.

suitable nesting habitat would be provided under alternatives C through E, and the proposed resource management plan, the cumulative increase would result in only slightly higher amounts of habitat and numbers of murrelets in the planning area. The SEIS stated, "When all major factors affecting the species are taken into account, including at-sea and land ownership patterns, the murrelet panel concluded there is between a 50 and 75 percent likelihood that the murrelet population on federal lands will be stable and well distributed after 100 years, regardless of the alternative selected." Thus, from a western Oregon perspective, under the proposed resource management plan, the levels of protection projected for all federal lands would result in only a moderate increase in habitat and numbers of murrelets over time.

The U.S. Fish and Wildlife Service has proposed the designation of 3,005,000 acres of federal land in the range of the murrelet as critical habitat. Although no quantitative assessment or sensitivity analysis was conducted, it is estimated that this designation would involve approximately 151,956 acres in the planning area and 542,584 acres in western Oregon on BLM-administered lands. This would have the greatest impact on the implementation of alternatives no action, A, and B as proposed, moderate impact on alternatives C and D and the least impact on alternative E, and the proposed resource management plan. Under all alternatives, the BLM will conference with the U.S. Fish and Wildlife Service on all actions that "may adversely affect" proposed critical habitat. If it is designated, the BLM will consult on all proposed actions that "may affect" critical habitat. The BLM will not carry out any action that is determined by the U.S. Fish and Wildlife Service to adversely modify or destroy designated critical habitat.

Other Special Status Animals and Habitat

In general, other special status species (federal candidate, state-listed, bureau sensitive) (see table 4-15) would be less impacted by BLM actions under alternatives C, D, E, and the proposed resource management plan than under alternatives no action, A, and B. This is primarily due to less timber harvest and fewer other intensive activities under the former alternatives. However, under all alternatives, special status species that occur in areas managed primarily for timber production could be adversely affected by timber harvest and associated practices. In these areas, BLM would determine whether a proposed action would contribute to the listing of affected

species prior to the action. If an action was determined to contribute to listing, the action would be modified.

A number of species (e.g., some migratory and oceanic species) are not expected to be affected under any of the alternatives primarily because of their limited habitat and/or distribution on BLM-administered lands. These species are listed at the end of table 4-15. Not enough information was available to assess the effects of the alternatives on invertebrates (e.g., caddisflies, butterflies, beetles, etc.). The following narratives refer to species for which impacts are anticipated.

Northern Red-Legged Frog (Federal Candidate 2)

Populations of red-legged frogs are likely to be adversely impacted under alternatives no action, A, and B (refer to discussion under amphibians in the Effects on Wildlife Habitat section of this chapter). Progressively better red-legged frog habitat would be expected under alternatives C through E, and the proposed resource management plan in the long term due to wider riparian buffer widths and improved condition of riparian habitats in the form of older seral stage forests. Aubry and Hall (1991) found that red-legged frogs were statistically most abundant in mature stands and least abundant in young stands. Bury et al. (1991) also concluded that red-legged frogs were most abundant at lower elevations with flatter slopes.

Global effects, unrelated to forest management, such as acid precipitation and ozone thinning could potentially affect amphibians.

Harlequin Duck (Federal Candidate 2)

All alternatives are likely to provide minimum protection of riparian zones for nesting purposes in the short term, although impacts of logging immediately adjacent to nesting areas are not well documented. Alternatives C, D, E, and the proposed resource management plan would provide progressively better protection to nesting habitat in the long term. Alternatives no action, A, and B would provide the least protection to this species. Riparian protection on private lands is unlikely to provide adequate nesting habitat. Adverse impacts due to logging (silt loads) also contribute to habitat degradation.

Table 4-15 Impacts to Other Special Status Animal Species During the Short Term (10 years) and Long Term (100 years) by Alternative¹

Species	Potential Impacts to Other Special Status Species Over Next 10/100 Years						
	NA	A	B	C	D	E	PRMP
Federal Candidate							
Amphibians							
Northern red-legged frog	-/-	-/-	-/-	0/+	0/+	0/+	0/++
Birds							
Harlequin duck	0/0	0/0	0/0	0/+	0/+	0/+	0/+
Mountain quail	0/0	0/0	0/0	0/+	0/-	0/-	0/-
Fish							
Coastal/Clackamas River coho	+/+	-/-	+/+	+/+	+/+	+/+	++/++
Coastal/Columbia/Willamette steelhead	+/+	-/-	+/+	+/+	+/+	+/+	+/++
Mammals							
Pacific fisher	-/-	-/-	-/-	-/0	-/+	0/0	-/++
Townsend's big-eared bat	-/-	-/-	-/-	0/0	0/0	0/0	+/+
Bureau Sensitive							
Amphibians							
Oregon slender salamander	-/-	-/-	-/-	0/0	0/+	0/0	0/++
Mammals							
Pacific fringe-tailed bat	-/-	-/-	-/-	0/+	0/+	0/+	0/++
Bureau Assessment							
Amphibians							
Clouded salamander	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Tailed frog	-/-	-/-	-/-	0/+	0/+	0/+	0/++
Birds							
Black-backed woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Great gray owl	-/-	-/-	-/-	0/+	0/+	0/+	0/+
Pileated woodpecker	-/-	-/-	-/-	-/+	-/+	-/+	-/+
Purple martin	-/-	-/-	-/-	0/0	0/+	0/+	0/++
Western bluebird	-/-	-/-	-/-	0/+	0/+	0/+	0/++
Mammals							
Marten	-/-	-/-	-/-	-/0	-/+	0/0	-/++
Pacific pallid bat	-/-	-/-	-/-	0/0	0/0	0/0	+/+

¹ Ratings are based on expected habitat/population impacts for the entire planning area. For any alternative, however, a positive impact could occur to a subpopulation or habitat area, even though a negative impact is expected for the entire population of a species. The reverse situation could also be true;

Impacts: 0 = no known effect; - = negative effect; + = positive effect;

Special Status Species for which no effects are anticipated under any of the alternatives:

Federal Endangered - Aleutian Canada goose, brown pelican, Oregon chub, Columbian white-tailed deer.

Federal Threatened - Western snowy plover, Oregon silverspot butterfly, northern sea lion.

Federal Candidate - Cascades frog, foothill yellow-legged frog, Larch Mountain salamander, spotted frog, black tern, loggerhead shrike, tricolored blackbird, white-faced ibis, California wolverine, North American lynx, white-footed vole, northwestern pond turtle.

Bureau Assessment - Barrow's goldeneye, black swift, bufflehead, common loon, dusky Canada goose, fork-tailed storm petrel, greater yellowlegs, horned grebe, Lewis' woodpecker, three-toed woodpecker, chum salmon, painted turtle, sharp-tail snake.

Source: Salem District wildlife files.

Mountain Quail (Federal Candidate 2)

Alternatives no action, A, and B would likely provide abundant habitat given projections for increased early seral stage habitat. However, this assumes that sufficient shrub and herbaceous species would persist in early seral stages after site preparation. Alternative C would likely benefit the species due to the variety of silvicultural systems employed, assuming sufficient shrub and herbaceous vegetation is available on harvested units. Alternatives D, E, and the proposed resource management plan may have some adverse impacts on the species on BLM-administered lands, primarily due to the emphasis on restoration of older forest communities at the expense of early seral stages. However, plentiful habitat is expected on adjacent private lands due to anticipated short timber harvest rotations. Refer to general discussion on effects of alternatives on upland game birds in the Effects on Wildlife Habitat section of this chapter.

Northern Goshawk (Federal Candidate 2)

Alternatives no action, A, and B would retain relatively little mature and old-growth habitat in the short and long term. As a result, northern goshawk populations would be expected to remain low or further decline. Alternatives C through E, and the proposed resource management plan (in increasing order of protection) would retain some or all of existing habitat and would increase this habitat in the long term. Thus goshawk populations would increase in the long term under these alternatives.

Cumulative effects on northern goshawks would be detrimental under alternatives no action, A, and B. They would be less detrimental under alternatives C through E, and the proposed resource management plan. This is due to greater retention of existing older forest and greater allowance for future stands to develop to older forest conditions on BLM-administered lands. Additional habitat would also be available on adjacent Forest Service land as a result of decisions made in the SEIS. Little habitat is anticipated on private lands.

Fish (Federal Candidate 2)

Declines in coastal stocks (Clackamas River coho and coastal/Columbia/Willamette steelhead) are probably related to a variety of factors that have likely

resulted in declines coastwide. Habitat for these stocks will likely improve under all alternatives (greatest under the proposed resource management plan) except alternative A. Because of the mixed land ownership patterns and impacts of activities on non-public lands, it is not possible at this time to estimate the impacts of implementation of the resource management plan alternatives on individual fish stocks.

Pacific Fisher (Federal Candidate 2)

Due to intensive forest management, alternatives no action, A, and B are likely to have detrimental effects on fishers in the Salem District. Alternative C would have questionable utility due to the scattered distribution of the old-growth and mature stands in proposed restoration and retention blocks, and the uncertainty of high retention prescriptions to provide suitable habitat. Alternative D would provide potential habitat areas, coincident with the spotted owl habitat conservation areas, throughout the district in the long term. Alternative E, while protecting the best (oldest) habitat in the short term, likely would not provide the best distribution of habitat in the long term. The proposed resource management plan would provide the highest quality and most acreage of habitat in the long term.

Townsend's Big-eared Bat (Federal Candidate 2)

The Townsend's big-eared bat, like other bats, is very intolerant to disturbance, especially in the maternal colony. Under alternatives no action, A, and B, the protection level of winter hibernation sites is likely insufficient to protect this habitat. Alternatives C, D, and E would likely maintain the habitat, given seasonal stipulations to avoid disturbance. The proposed resource management plan provides the greatest protection for this species.

Oregon Slender Salamander (Bureau Sensitive)

Alternatives no action, A, and B could cause a substantial reduction in populations of this species. This would be due to the limited geographic range of this species and the removal or modification of remaining old-growth and mature forests within its limited range. Ensuing desiccation and loss of residual large down wood are expected results from logging activities. Gilbert and Allwine (1991) reported this species was primarily found in downed logs of the

older decay classes. Alternative C would likely retain some populations of this species in the long term; however, none of the old-growth restoration and retention blocks have been inventoried. Areas proposed for high retention of overstory canopy and longer rotation lengths may provide suitable habitat conditions in the future, but this is currently unproven. In the long term, alternative D would protect and create habitat for this species within the northern spotted owl habitat conservation areas. Alternative E would provide protection for forest stands older than 150 years of age, but would maintain the current fragmented distribution of the habitat. The proposed resource management plan would provide the greatest protection in the long term in the Late-Successional and Riparian Reserves. Global effects, unrelated to forest management, such as acid precipitation could potentially affect amphibian species.

Pacific Fringe-tailed Bat (Bureau Sensitive)

Alternatives no action, A, and B would likely have adverse impacts to the species due to harvest of old growth and reduced protection of rock areas used for winter hibernation sites. Alternatives C, D, E, and the proposed resource management plan would have progressively less harvest of old growth as well as providing better protection to winter sites. The proposed resource management plan provides protection for caves, mines, and abandoned wooden bridges and buildings used for roosting by this species.

Clouded Salamander (Bureau Assessment)

Impacts to this species are anticipated to follow the same pattern as for the Oregon slender salamander, although lesser in scale due to the species' ability to inhabit a wider range of habitat seral stages. The primary limiting factors for the species would be retention of large woody debris and snags and maintenance of a humid microclimate which would be more likely achieved under the proposed resource management plan followed by alternatives C, D, and E in contrast to alternatives no action, A, and B. Corn and Bury (1991) found clouded salamanders to be closely associated with down wood and predicted this species to be rare in intensively managed forests where down wood is reduced. Global effects, unrelated to forest management, such as acid precipitation could potentially affect amphibian species.

Tailed Frog (Bureau Assessment)

Under alternatives no action, A, and B, water quality is expected to decline from forest harvesting and may negatively impact known and suspected populations of tailed frogs in all watersheds. Bury et al. (1991) stated that this species seems to be sensitive to timber harvest, and its survival may depend on the availability of cool streams for breeding and larval development as well as the presence of adjacent forested habitats for shade and retention of stream substrate quality. Greater protection of riparian areas and older forest in the long term under the proposed resource management plan would benefit this species the most followed by alternatives C through E. Aubry and Hall (1991) reported tailed frogs were more abundant in mature than young stands although Corn and Bury (1991) and Gilbert and Allwine (1991) found no relationship with stand age. Alternative C may protect some habitat areas within the restoration and retention blocks in the long term. Alternative D would provide good protection within northern spotted owl habitat conservation areas, but could result in habitat loss elsewhere. Alternative E would provide protection of known and suspected populations in forest stands greater than 150 years of age, and protection of riparian vegetation on all intermittent streams as well. Global effects, unrelated to forest management, such as acid precipitation and ozone thinning could potentially affect amphibian species. Refer to general discussion on effects of the alternatives on amphibians in the Effects on Wildlife Habitat section of this chapter.

Black-backed Woodpecker (Bureau Assessment)

All alternatives are not expected to provide adequate habitat for this species in the short term due to the current scarcity of snags. In the long term, alternatives C, D, E, and the proposed resource management plan are expected to provide this habitat. In addition, the proposed resource management plan provides habitat protection for this species as recommended by the Scientific Advisory Team and established in the SEIS.

Great Gray Owl (Bureau Assessment)

This species is expanding its range into western Oregon Douglas-fir forests, but is primarily found in higher elevation forests of the Cascade Range, preferring conifer habitat around meadows and natural openings. Alternatives no action, A, and B

are expected to have more detrimental impacts on the potential habitat of this species. Protection of meadows and openings and regrowth of adjacent habitat should benefit this species under remaining alternatives in the long term. The proposed resource management plan provides specific protection to this species in the form of buffers around meadows and around known nest sites.

Northern Saw-whet Owl (Bureau Assessment)

Alternatives no action, A, and B would have highly adverse impacts to this species in both the short and long term. Alternatives C, D, E, and the proposed resource management plan would have low impacts during the first decade. The proposed resource management plan would provide the greatest protection in the long term, but alternatives C, D, and E would also restore and retain some good quality habitat in the long term.

Pileated Woodpecker (Bureau Assessment)

Refer to discussion under Dominant Woodpeckers in the Effects on Wildlife Habitat section of this chapter.

Purple Martin (Bureau Assessment)

In the short term, alternatives no action, A, and B would result in a reduced amount of potential habitat due to minimum snag retention following timber harvest. Alternatives C, D, E, and the proposed resource management plan would result in maintenance of habitat provided that soft snag retention efforts on harvest units are successful. In the long term, alternatives no action, A, and B would provide little potential nesting habitat, and alternatives C, D, E, and the proposed resource management plan would provide an increasingly improved situation for potential nesting habitat.

Western Bluebird (Bureau Assessment)

Alternatives no action, A, and B, while resulting in the creation of high levels of early successional stages required by this species through timber harvest, are not likely to produce enough snags of the proper condition to provide minimum nesting conditions. Use of nest boxes in early successional stages would benefit this species. In the short term, alternatives C,

D, E, and the proposed resource management plan would likely leave sufficient snags to maintain nesting trees, but could suffer somewhat from distribution problems (as in alternatives D and E), and reduced controlled fires to promote foraging habitat (alternative C and the proposed resource management plan). In the long term, the proposed resource management plan should provide the most benefit to this species followed by alternatives C through E.

Chum Salmon (Bureau Assessment)

Effects on chum salmon are considered minimal under all alternatives because of their limited habitat and distribution on BLM-administered lands.

American Marten (Bureau Assessment)

Impacts to this species are anticipated to be similar to the Pacific fisher previously discussed.

Pacific Pallid Bat (Bureau Assessment)

Similar to the Townsend's big-eared bat, this species utilizes a variety of habitats, and is highly dependent on caves to provide winter hibernation sites and nursery colonies. Little is known of this species within the Salem District. However, the same impacts are anticipated for this species as those previously described for the Townsend's big-eared bat. The proposed resource management plan provides protection for caves, mines, and abandoned wooden bridges and buildings used for roosting by this species.

SEIS Special Attention Animal Species and Habitat

The analysis of impacts of the proposed resource management plan also incorporates by reference the conclusions in appendix J2 of the SEIS regarding fish, arthropods, mollusks, amphibians and reptiles, birds, mammals other than bats, bats, and early successional species. In summary, the SEIS concluded that its alternative 9 (which is essentially incorporated in the proposed resource management plan) would have the following consequences:

Fish

Alternative 9 would result in a strong likelihood of providing sufficient aquatic habitat to support stable, well-distributed populations of coho salmon, fall and spring chinook salmon, summer and winter steelhead trout, sea-run cutthroat trout, and resident rainbow and cutthroat trout.

Arthropods

Alternative 9 would provide fairly high habitat protection to the various functional groups assessed in the SEIS compared to the other alternatives. Standards and guidelines were incorporated into alternative 9 which might increase the likelihood that the necessary habitat components would be maintained.

Mollusks

Alternative 9 also provides fairly high habitat protection to mollusks. For example, Riparian Reserves are important to the maintenance of habitat for freshwater snails and clams, and alternative 9 rated well for these species. In addition, standards and guidelines were incorporated into alternative 9 to benefit the habitat components required by many of these species. Nonfederal lands are an important consideration for the persistence of some mollusks, and substantial risks of extirpation will remain even with significant conservation measures in place on federal lands. Species with especially high risk are associated with large rivers.

Amphibians

Alternative 9 ranks well in providing the necessary habitat components for amphibians. Standards and guidelines were incorporated into alternative 9 which might benefit all amphibians assessed in the SEIS. For example, for the Cascade torrent salamander, southern torrent salamander, and tailed frog, alternative 9 is expected to provide habitat protection from Riparian Reserve scenario 1. Retention of coarse woody debris in the Matrix is expected to provide habitat protection for the clouded salamander and Oregon slender salamander; and survey and manage standards and guidelines will benefit the Larch Mountain salamander.

Birds

Alternative 9 is favorable to birds because it provides a set of allocations and management practices that produce the necessary habitat components for birds. Standards and guidelines incorporated into alternative

9 will benefit the black-backed woodpecker. All of the birds considered in the SEIS occur on both federal and nonfederal lands. Some are neotropical migrants and migrate to Mexico or central America for the winter season. For all of these migratory species, habitat on the winter range is likely as important as breeding habitat in maintaining viable populations. No other standards and guidelines on federal land can provide habitat to mitigate the potential cumulative effects on these species from loss of habitat on nonfederal lands. Because the common merganser occupies low elevation waterways and riparian habitat primarily on nonfederal lands, its persistence cannot be adequately assured by any of the alternatives. No measure on federal habitat can provide habitat to mitigate the potential cumulative effects on this species from loss of riparian habitat on nonfederal lands.

Mammals Other Than Bats

Alternative 9 provides the necessary habitat components for those species assessed in the SEIS. Standards and guidelines were incorporated in alternative 9 which will benefit all these species, including implementation of Riparian Reserve scenario 1 and retention of coarse woody debris on Matrix lands. Other standards and guidelines include provision of spotted owl activity centers in the Matrix and the survey and manage guideline for the red tree vole. None of the species that occur within the planning area are highly restricted to nonfederal lands.

Bats

Alternative 9 would maintain and enhance the habitat components needed by bats in the district. Two standards and guidelines including protection of caves and abandoned mines and other structures and retention of clumped green trees and snags in the Matrix would contribute to the protection of these species.

Early Successional Species

Alternative 9 would provide for a relatively low amount of acres of this successional stage on BLM-administered lands. The BLM-administered lands in the district occur within a broader landscape of nonfederal lands where substantial early-seral forests will be created through logging and other management activities. These lands may contribute to the maintenance of early successional forest habitat over time.

Effects on Special Areas

Resource management impacts on existing and potential special areas would vary depending upon land allocations and management prescriptions proposed under each alternative. Table 4-16 displays possible changes in the condition of existing and potential special areas in the short term. Changes are compared to current resource conditions. They are based on an assumption that mineral exploration and development in special areas can be excluded and/or tightly controlled under all alternatives except no action (see table 2-2 for proposed management constraints in special areas and appendix M for proposed leasing stipulations in special areas).

Under the no action alternative, energy and mineral development activity could occur in 17 of the existing special areas. Special natural values could be lost or damaged if development occurs in these areas. Nine potential special areas would not be designated or protected by other allocations. They would be subject to varying degrees of protection and/or commodity development depending upon resource conditions or 1983 primary land use allocations. Some protection would be provided by conditions such as nonforest or fragile site and/or by allocations such as riparian management areas. In the short term timber could be harvested in ten of the potential special areas, and some, if not all, special values would be lost or damaged. Two potential research natural area cells would not be filled using BLM-administered lands. (These cells or classifications are used to assure that examples of the full spectrum of Oregon's natural ecosystems and native species are preserved for future generations.) There are no other known localities where these cells could be filled. The failure to maintain these cells in an undisturbed condition would diminish, if not destroy, their values for research and for monitoring changes in unmanaged baseline areas compared to managed areas. By failing to gain knowledge of ecosystem functions, the quality of future management may be diminished.

Under alternative A, 18 existing and 8 potential special areas would be available for resource development activities, such as road construction, timber harvest and mineral development. These activities could cause

the loss of or damage to special values for which the areas were designated or proposed for designation. In the short term, approximately 1,400 acres of timber could be harvested in eleven existing special areas and 300 acres in five potential special areas. Special values could be lost or damaged by ground and vegetation-disturbing activities. Protection of six existing research natural areas would cease, and two potential research natural area cells would not be filled using BLM-administered lands. There are no other known localities where these cells could be filled. For consequences of not maintaining research natural area cells, see the no action alternative.

Alternative B would make available one existing and seven potential special areas to varying degrees of resource development depending upon primary land use allocations. In the short term, about 710 acres of timber could be harvested in the Nestucca River Area of Critical Environmental Concern secondary zone. This harvest activity could have adverse impacts on recreation, visual and fishery values in the primary zone. In the short term approximately 160 acres of timber could be harvested in four potential special areas; some, if not all, special values would be lost or damaged. One potential research natural area cell would not be filled using BLM-administered lands. There are no other known localities where this cell could be filled. For consequences of not maintaining cells, see the no action alternative.

Under alternatives C and D, road construction and timber harvest would be planned in the Eagle Creek potential watershed protection area. These activities could adversely affect fishery values and water quality in a fragile watershed.

Under alternative E, no existing or potential special areas would be adversely impacted by resource development activities.

Under the proposed resource management plan, one existing and four potential areas of critical environmental concern would not be proposed for special area designation. However, protection of special values would be provided by other land use allocations. The undesignated sites/areas and the principal land use allocations are as follows:

Table 4-16 Possible Changes in the Condition of Existing and Potential Special Areas in the Short Term

Special Area	Possible Changes by Alternative						
	NA	A	B	C	D	E	PRMP
Existing							
Big Canyon ACEC / ONA	-	-	+	+	+	+	+ ¹
Carolyn's Crown ACEC / RNA	-	-	+	+	+	+	+
Elk Creek ACEC	-	+	+	+	+	+	+
Grass Mountain ACEC / RNA	-	-	+	+	+	+	+
High Peak-Moon Creek ACEC / RNA	-	-	+	+	+	+	+
Larch Mtn. Environmental Education Site	-	-	+	+	+	+	+
Little Grass Mtn. ACEC / ONA	-	-	+	+	+	+	+
Little Sink ACEC / RNA	+	+	+	+	+	+	+
Lost Prairie ACEC	-	-	+	+	+	+	+
Marys Peak ACEC / ONA	-	-	+	+	+	+	+
Middle Santiam Terrace ACEC	-	-	+	+	+	+	+
Nestucca River ACEC	-	-	-	+	+	+	+
Rickreall Ridge ACEC	-	-	+	+	+	+	+
Saddleback Mtn. ACEC / RNA	-	-	+	+	+	+	+
Sandy River Gorge ACEC / ONA	0	-	+	+	+	+	+
Sheridan Peak ACEC	-	-	+	+	+	+	+
Soosap Meadows ACEC	0	-	+	+	+	+	+
The Butte ACEC / RNA	-	-	+	+	+	+	+
Valley-of-the-Giants ACEC / ONA	-	-	+	+	+	+	+
Willamette River Parcels	-	+	+	+	+	+	+
Williams Lake ACEC	0	-	+	+	+	+	+
Yaquina Head ACEC / ONA	+	+	+	+	+	+	+
Potential							
A.J. Dwyer Potential Scenic Area	-	+	+	+	+	+	+
Alsea Bay Island Potential ACEC	0	+	+	+	+	+	+ ¹
Crabtree Creek/Shafter Creek Potential ACEC / RNA / ONA	-	-	+	+	+	+	+
Eagle Creek Potential Watershed Protection Area	-	-	-	-	-	+	+ ¹
Forest Peak Potential ACEC / RNA	-	-	-	+	+	+	+
North Santiam Potential ACEC	-	-	-	+	+	+	+
Walker Flat Potential ACEC	0	-	-	+	+	+	+
Wells Island Potential ACEC	-	+	+	+	+	+	+ ¹
White Rock Fen Potential ACEC	0	0	0	+	+	+	+
Willhoit Springs Potential ACEC	-	-	-	+	+	+	+
Yampo Potential ACEC	-	-	-	+	+	+	+
Yellowstone Creek Potential ACEC	-	-	-	+	+	+	+ ¹

¹ Not proposed for designation under the proposed resource management plan (see text). All others proposed for designation.

Impacts: 0 = none or negligible; - = adverse; + = beneficial. See appendix W for rating rationale.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

ACEC = Area of Critical Environmental Concern

ONA = Outstanding Natural Area

RNA = Research Natural Area

Source: Salem District resource specialists.

Site/Area	Land Use Allocation
Big Canyon	Riparian Reserve, Late-Successional Reserve
Alsea Bay Island	Riparian Reserve
Eagle Creek Watershed	Riparian Reserve, General Forest Management Area (also identified as a Tier 2 Key Watershed under the proposed resource management plan)
Wells Island	Riparian Reserve
Yellowstone Creek	Riparian Reserve, Late-Successional Reserve

Management activities in these sites/areas, if any, will require special assessments and analyses prior to management decisions (see chapter 2, Late-Successional Reserves, Riparian Reserves, and Aquatic Conservation Strategy).

Big Canyon is open to mineral entry, and natural values could be damaged by future exploration and development. The potential for energy and mineral occurrence is high.

In the Sheridan Peak Area of Critical Environmental Concern, any management activity in the Late-Successional Reserve would be designed to conserve a population of *Poa maritima*. The plant no longer has federal status, but it is still of interest to botanists. Research has shown that it can survive certain kinds of disturbances (Palmer et al. 1987).

Conclusion

Special areas would receive the highest level of protection and management under alternatives C through E, and the proposed resource management plan. Some of the areas would be available to meet a growing recreation demand in western Oregon. Others would provide relatively undisturbed areas for research and study in special ecosystems. Under alternatives no action and A, special values in most existing and potential areas would be jeopardized by the lack of protective designations and management emphasis. The same would be true for potential special areas under alternative B.

Effects on Cultural Resources Including American Indian Values

Under all alternatives, inventories prior to on-the-ground project work would minimize adverse impacts to cultural resources. However, some cultural resources may not be detected during inventories due to thick duff, dense vegetation or other hindering factors. The potential for impacting undetected resources would vary with the amount of surface-disturbing activity permitted under each alternative. Alternatives no action, A, and B, which propose high levels of surface-disturbing activity, would have the highest potential for impact on undetected cultural resources. Alternatives C through E, and the proposed resource management plan would have reduced potential for such impact. Some impact on cultural values would occur regardless of which alternative is selected for implementation.

Effects on Visual Resources

Clearcutting, road construction, and most other timber management practices change vegetative patterns, alter species composition, disrupt the land surface and cause visual impacts. The severity of an adverse visual impact depends on type of harvest; location, number, size and shape of cutting units; yarding method; location and design of roads; amount and treatment of logging slash and road construction debris; and visibility of disturbed areas. The pre-harvest condition (i.e., scenic quality) of a viewshed is also a determining factor. Generally, viewsheds that are noticeably altered can be further modified with less adverse visual impact than viewsheds with little or no visible alteration. In some situations, timber management practices can help achieve visual resource management objectives. Examples are the removal of dead or dying trees, thinning foreground vegetation to create pleasing views, and the manipulation of contrasting cutting boundaries, especially on ridgetops.

In each of the alternatives, except D, the visual resource management classes and management objectives differ from the inventory classifications of areas shown in map 3-7. The visual resource management classes and objectives of an alternative are designed to fit into the overall resource management

emphasis of the alternative. Inventory classes were downgraded (e.g., class II to IV) or upgraded (e.g., class II to I). An alternative which upgrades visual resource management inventory classes would provide more restrictive management objectives (e.g., less vegetative disturbance) for affected areas. Downgrading would have the opposite effect and, consequently, could possibly result in a high level of vegetative disturbance in affected areas. The effect of downgrading might be to lower the scenic quality of downgraded areas. However, BLM's ability to effect an area's overall scenic quality depends to a large extent on land ownership patterns. In more than 50 percent of the areas inventoried, non-BLM-administered lands and management practices dominate the landscape. This may have a greater effect on overall scenic quality than activities on downgraded BLM-administered lands.

Table 4-17 shows probable changes in visual resource conditions in the short term due to management activities under each alternative.

Under all alternatives, no adverse changes in visual resource conditions are expected in areas such as Table Rock Wilderness, Yaquina Head Area of Critical Environmental Concern/Outstanding Natural Area, and Wildwood and Fishermen's Bend recreation

sites. This is because they would be managed to meet visual resource management inventory standards. On the majority of BLM-administered land, changes in visual resource conditions would vary by alternative because of downgrading and upgrading of inventory classes.

The long-term effects of alternatives C through E, and the proposed resource management plan would be a general improvement of the viewshed compared to what exists today. However, they would not return to their natural condition.

Under the no action alternative, general visual resource conditions on BLM-administered lands would continue in a moderate decline. This is due to visual resource management class IV management of lands inventoried as visual resource management classes I, II and III and continuation of the timber harvest levels and prescriptions established in 1983.

Alternative A would have the most impact on visual resources. A significant impact on visual resources would occur because of widespread vegetative disturbances in the downgraded areas. Approximately 103,500 acres inventoried as visual resource management classes I, II, and III would be managed as class IV.

Table 4-17 Probable Changes in Visual Resource Conditions in the Short Term

VRM Class	Existing Condition ¹	Visual Resource Condition Changes by Alternative ²						PRMP
		NA	A	B	C	D	E	
I	a	-	-	0	+	+	+	0
II	a	-	-	-	-	0	+	-
III	b	-	-	-	-	0	+	0
IV	c	0	0	0	0	0	N / A	0

¹ Condition determined by Salem District landscape architect based on field observations.

a = slightly altered viewsheds with scenic value

b = moderately altered viewsheds

c = highly altered viewsheds with low scenic value

² Impacts: + = beneficial; 0 = none or negligible; - = adverse. Ratings of change (+, -, 0) represent the anticipated effect of timber management and other commodity development on existing visual resource conditions, taking into consideration: (1) visual resource management class objectives for affected areas; (2) probable effects of upgrading/downgrading; (3) land ownership patterns and adjacent land uses; and (4) level of timber harvest and other commodity development within the next ten years.

VRM = Visual Resource Management

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

N / A = Not Applicable

Source: Salem District resource specialist.

Under alternative B, visual resource management class IV management would be applied to 78,800 acres inventoried as visual resource management classes I, II and III. Significant adverse impacts to visual resources would occur in the downgraded areas.

Under alternative C, visual resource management class IV management would be applied to 37,000 acres inventoried as visual resource management classes I, II and III. Some inventoried visual resource management class II areas which fall within areas managed for 15 to 20 percent basal area retention would in essence be managed as visual resource management class III. Most of the selective harvesting under this alternative would keep adverse visual resource impacts at a low level.

Alternative D would benefit visual resources because all lands would be managed to inventory standards. Scenic quality would be maintained or improved on BLM-administered lands.

Alternative E would be the most beneficial for visual resources as it provides the least amount of vegetative disturbance. Unharvested areas would be maintained at inventory class conditions or better. All high value scenery and sensitive viewing areas would be protected from noticeable disturbance. The condition of areas with moderate to low value scenery and/or low sensitivity would improve in the long term because visual resource management class IV areas would be managed to visual resource management class III standards.

Under the proposed resource management plan, visual resource management class IV management would be applied to 45,300 acres inventoried as visual resource management classes I, II and III. Some of these downgraded acres would be managed as Late-Successional Reserves and Connectivity/Diversity Blocks (150-year rotations). On other downgraded acres in the General Forest Management Area, six to eight green trees per acre would be retained in harvest units. These features of the proposed resource management plan should keep adverse visual impacts at a low level.

Effects on Wild and Scenic Rivers

River-related outstandingly remarkable values within administrative boundaries of the existing congressionally designated Quartzville Creek and Clackamas, Salmon and Sandy Wild and Scenic Rivers would not be adversely affected by BLM resource management activities. They would be fully protected under all management alternatives. Similarly, no BLM resource management activities proposed under the no action alternative would be allowed to diminish the river-related values or highest tentative river area classification of any of the 37 river segments determined to be eligible for inclusion as components of the National Wild and Scenic Rivers System. These river-related values and tentative classifications would receive full interim protection pending resolution of the suitability study issue. This does not mean resource management activities would be precluded within the corridors of eligible river segments. Such activity would be allowed to the extent that identified outstandingly remarkable values would be protected and highest tentative river area classifications would be maintained.

The following environmental consequences discussion relates solely to the eight BLM-administered river segments assessed for suitability in this proposed resource management plan.

To be eligible for inclusion as a component of the national system, a river or river segment must be free flowing and possess at least one outstandingly remarkable value. These two congressionally established criteria are used to judge changes in resource conditions, particularly adverse changes. If resource management activities inherent to a specific alternative would alter flow characteristics of a river segment, or degrade the segment's river-related outstandingly remarkable values, the change created would be adverse.

None of the alternatives include BLM resource management activities that would adversely affect the free-flowing condition of the eight river segments. However, under alternatives where a river or river segment is found to be unsuitable, an externally proposed project, such as a dam, may be determined consistent with the resource management plan. Under this circumstance, a proposed project could be approved and ultimately constructed, thereby interrupting the segment's free-flowing condition. The

Impacts of any site-specific dam proposal would be analyzed in a separate environmental impact statement specific to the proposed project.

The effects on river-related values from BLM resource management activities would vary by alternative. It is assumed that the same type of activities affecting outstandingly remarkable values in the short term would continue over the long term. On lands available for commodity development, but deferred in the short term, it is assumed that over the long term, these lands would be developed. Table 4-18 shows, by alternative, probable short-term changes in the outstandingly remarkable value conditions of each of the eight river segments assessed. The rationale supporting these determinations of condition change is presented in appendix AA. Suitability findings for each alternative, including the number of segments and total river miles included, are displayed in chapter 2 (table 2-1).

As shown in table 4-18, short-term changes to the fish-related outstandingly remarkable value would be negligible or nonexistent for three river segments, regardless of alternative (see Effects on Fish section for rationale). This outstandingly remarkable value will not be further discussed. The short-term impacts of probable changes in other outstandingly remarkable values within each river's approximately one-half mile wide corridor are summarized below.

Under the no action alternative, the identified outstandingly remarkable values and tentative river area classifications of all eight river segments would be protected. As previously stated, the BLM's interim protection policy would be in effect pending resolution of the suitability study issue.

The outstandingly remarkable values of Crabtree Creek (segment A), Elkhorn Creek, Lobster Creek (segment A) and the Molalla River (segment B) would not be adversely affected by management under alternative A. The protective land allocations prescribed under this alternative, coupled with the relatively few timber harvest units and total harvest acres prescribed, would protect their respective river-related values over the short term. Most BLM-administered lands would continue to be managed for multiple use, including timber management. An exception would be the protective land allocations prescribed under alternative A for the river corridors of the Nestucca, North and South Forks Alsea River and Walker Creek. During the expected ten-year life of the plan, it is probable that some prescribed management activities would adversely affect the outstandingly remarkable values for which these four river segments were determined eligible. These

activities would include an estimated 87 timber harvest units (1,300 acres), and an estimated 2.4 miles of new road construction. Under this alternative, the eligibility status of the South Fork Alsea River and Walker Creek would not be maintained. Elimination of the Alsea Falls Recreation Site and a minimal protective land allocation covering the Walker Flat area would reduce identified outstandingly remarkable values for these two river segments to less than an outstandingly remarkable condition. While the eligibility status of the other six river segments would be maintained over the expected life of the plan, timber harvest and associated activities would drop the North Fork Alsea River from scenic to recreational river area classification potential. The tentative classifications of Crabtree Creek (segment A), Elkhorn Creek, Lobster Creek (segment A), Molalla River (segment B) and Nestucca River would not change.

With one exception, the effects under alternative B would be the same as alternative A, even though there would be a reduction of 28 timber harvest units, 500 harvest acres and 1.24 miles of new road construction from that prescribed under alternative A. During the expected life of the plan under alternative B, an estimated 59 timber harvest units totaling just under 800 acres, and an estimated 1.25 miles of new road construction, would adversely affect the outstandingly remarkable values for which the Nestucca and North Fork Alsea Rivers and Walker Creek segments were determined eligible. The exception is the South Fork Alsea River. This segment's one outstandingly remarkable value and highest tentative river area classification would be maintained under this alternative. The continued land allocation covering the Alsea Falls Recreation Site would protect the river corridor's geological outstandingly remarkable value.

The outstandingly remarkable values of all eight river segments would not be adversely affected by management under alternatives C through E, and the proposed resource management plan. The protective land allocations prescribed under these alternatives, coupled with the relatively few timber harvest units and total harvest acres prescribed, would protect their respective river-related values over the short term. Likewise, each segment's highest tentative river area classification would be maintained under these alternatives.

Irreversible or irretrievable commitment of resources and long-term effects would be as follows:

- Road construction and harvest of the existing forest stand in the unroaded portion of the Elkhorn

Table 4-18 Probable Short-Term Changes in Outstandingly Remarkable Value Conditions for River Segments Assessed Under Each Alternative

River Name	Highest Tentative Classification	Value ¹	Probable Changes by Alternative ²						PRMP
			NA	A	B	C	D	E	
Crabtree Creek (segment A)	Scenic	Scenic	0	0	+	+	+	+	+
		Recreation	0	0	+	+	+	+	+
		Wildlife	0	0	+	+	+	+	+
		Cultural	0	0	0	0	0	0	0
		Ecological	0	0	+	+	+	+	+
Elkhorn Creek	Wild	Scenic	0	+	+	+	+	+	+
		Wildlife	0	+	+	+	+	+	+
Lobster Creek (segment A)	Recreational	Fish	0	0	0	0	0	0	0
Molalla River (segment B)	Recreational	Scenic	0	0	0	+	0	0	+
		Recreation	0	0	0	+	0	0	+
		Geological	0	0	0	0	0	0	0
Nestucca River (segment A)	Recreational	Scenic	0	-	-	0	+	+	+
		Recreation	0	-	-	0	+	+	+
		Fish	0	0	0	0	0	0	0
North Fork Alsea River	Scenic	Scenic	0	-	-	+	+	+	+
		Fish	0	0	0	0	0	0	0
		Wildlife	0	-	-	+	+	+	+
South Fork Alsea River	Recreational	Geological	0	-	0	0	0	0	0
Walker Creek	Recreational	Ecological	0	-	-	+	+	+	+

¹ Identified outstandingly remarkable value.² Impacts: + = beneficial; - = adverse; 0 = none or negligible (see appendix AA for the rationale supporting these determinations of condition change).

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Salem District resource specialist.

Creek segment's corridor would be an irreversible or irretrievable commitment of resources. Any opportunity to manage this river segment as a wild river area would be lost with implementation of such management activities.

- Harvest of old-growth forest stands that contribute to the specific outstandingly remarkable values (scenery, recreation, wildlife, and ecological) which make Crabtree Creek (segment A), Elkhorn Creek and North Fork Alsea River eligible for inclusion in the system would constitute a long-term commitment of resources (at least for the time it would take to reestablish old-growth forest stands).

Effects on Recreation

Recreationists visit BLM-administered lands to gain satisfying outdoor experiences. They accomplish this by participating in recreation activities within preferred settings. The broadest segment of visitors have quality experiences when they have a choice among a diverse set of outdoor recreation opportunities. The degree to which a particular alternative would benefit or adversely affect a visitor's outdoor recreation experience depends on the management actions involved. Management actions which improve opportunities for visitors seeking one form of recreation may diminish opportunities for visitors seeking other forms. This is because activity participation requirements and expectations vary from one recreation user group to the next. The primary impacts of BLM resource uses and management practices (e.g., timber harvest, construction of roads and structures, and mineral development) on recreation are related to changes in settings. These may be physical alteration of resources available, new and/or different opportunities for social interaction with other forest visitors, or road closures and limits on the length of time visitors may stay in a particular area or site. These setting changes affect the type and distribution of recreation opportunities available on BLM-administered lands, the levels and patterns of visitor use and, ultimately, the quality of recreational experiences desired by the visiting public. For example, use of a recreation management area might be increased by new road construction. Under this circumstance, the setting condition change would provide more and easier access, allow use of recreation vehicles and equipment not previously possible in an unroaded setting, or foster additional social interaction among the area's visitors. On the other hand, use of the area for recreation purposes may temporarily or permanently decline. This would occur if the area's overall setting

changes and visitors cannot obtain desired recreation experiences. When expectations of people cannot be satisfied in a particular area, their natural inclination is to go to other areas where they can fulfill their recreational needs. These areas may be other BLM-administered lands, or areas administered by other public or private entities.

Under all alternatives, dispersed recreation activity on BLM-administered lands would increase throughout the planning area as visitor demands for such use increases. Although levels of use might vary by alternative, the differences are considered minor. Of particular relevance is that BLM-administered lands and waters, and the transportation system providing access to them, are extensive. They would not be used to capacity for many preferred activities during the short term under any alternative.

Table 4-19 shows anticipated short-term capability of BLM-administered facilities and resources to meet projected recreational demand for 11 major use categories by alternative. As shown, projected demand for all recreation uses would be met under alternatives D, E, and the proposed resource management plan. This conclusion appears valid even though the SEIS (U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994) indicates that the supply of landscape settings with little development, little management activity, and no motorized access would not meet anticipated demand over the short term. This SEIS assessment considered recreation needs in terms of total acres within specific settings. Table 4-19, on the other hand, displays recreation demand in terms of total visitation by specific activity groupings. These separate evaluations cannot be compared for consistency since the conclusions reached are based on very different sets of data.

Under the no action alternative, projected demand would be met for all recreation uses in the short term with one exception. Nonmotorized travel, primarily related to developed trail systems, would not be met. Several potential trails capable of handling hiking, backpacking, horseback riding and mountain biking demand are not included as part of the 1983 land use plan under which the BLM is currently operating. Except for nonmotorized travel, management actions carried out under the no action alternative would not adversely affect recreation experiences of forest visitors. The construction of a high-use recreation site near the western tip of the peninsula on Green Peter Reservoir, along with its ancillary facilities (boat ramps, beach and swimming area, trailheads and trail

Table 4-19 Anticipated Short-Term Capability of BLM-Administered Facilities and Resources to Meet Projected Recreational Demand for 11 Major Use Categories by Alternative

Recreation Use Category ¹	Projected Demand (in visits for year 2000) ²	Anticipated Capability to Meet Demand by Alternative ³						
		NA	A	B	C	D	E	PRMP
Off-highway travel (e.g., driving motorcycle, ATV and 4x4 vehicles off the road)	140,300	yes	yes	yes	yes	yes	yes	yes
Motorized travel (e.g., sightseeing and exploring)	847,900	yes	yes	yes	yes	yes	yes	yes
Nonmotorized travel (e.g., bicycling, day hiking/backpacking and horseback riding)	485,400	75%	60%	60%	70%	yes	yes	yes
Camping	284,600	yes	50%	80%	yes	yes	yes	yes
Hunting	90,100	yes	yes	yes	yes	yes	yes	yes
Other land-based use (e.g., picnicking, studying nature and viewing wildlife)	693,200	yes	60%	80%	yes	yes	yes	yes
Fishing	166,700	yes	yes	yes	yes	yes	yes	yes
Boating	43,800	yes	80%	85%	yes	yes	yes	yes
Other water-based use (e.g., swimming, general waterplay, tubing)	128,700	yes	70%	80%	yes	yes	yes	yes
Winter sports (e.g., cross-country skiing, snowshoeing and sledding/snowplay)	42,000	yes	yes	yes	yes	yes	yes	yes
Snowmobiling	3,200	yes	yes	yes	yes	yes	yes	yes
Total	2,925,900							

¹ Source: U.S. Department of the Interior, BLM, Recreation Management Information System.² Extrapolated from: 1988 Statewide Comprehensive Outdoor Recreation Plan for Oregon (Oregon Parks and Recreation Department 1988) as revised.³ A "yes" means demand would be fully met. A "percentage figure" (%) means the percent of total demand that would be met.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

system, etc.) would help meet a substantial portion of projected demand on BLM-administered lands in the planning area.

Under alternative A, projected demand would not be met for several recreation uses in the short term. Since only two existing high-use recreation sites and high-use trails would be managed and/or retained under alternative A, projected demand for facility-dependent activities would not be met. An exception would be those dispersed recreation activities requiring additional miles of developed road access. The management scenario to not develop any new recreation sites and trails, to close and remove facilities from ten existing recreation sites, and to close five of the district's seven existing trails would adversely affect visitor experiences. Facility-dependent camping, picnicking, hiking, boating and other water-based demand would be the most severely affected by management under this alternative. Contributing to this is that alternative A would not allocate lands covering any of the potential special recreation management areas. This would eliminate the development of additional major recreation sites and facilities associated with special recreation management area allocation and management. Over the short term, timber harvest would not adversely affect dispersed or facility-dependent recreation opportunities. However, the allocation of lands to timber management which were once dedicated to developed recreation sites and facilities may adversely affect facility-dependent recreation opportunities over the long term. If timber harvest occurs within or in proximity to the closed recreation sites during the short term, thus diminishing the site's values for possible reestablishment in the future, then there would be an adverse long-term impact. This same long-term impact would apply equally to areas identified as potential recreation sites not developed and maintained.

Under alternative B, projected demand would not be met for several recreation uses in the short term. Though all existing recreation sites and two existing high-use trails would be maintained, two potential recreation sites (on public domain lands) would be reserved for development, and four wilderness trailheads would be renovated, projected demand for facility-dependent activities would not be met. An exception would be those dispersed recreation activities requiring additional miles of developed road access. The management scenario to not develop 15 of the 21 potential recreation sites or any of the potential trails, and to close five of the district's seven existing trails, would adversely affect visitor experiences. Facility-dependent camping, picnicking, hiking, boating and other water-based demand would

be the most severely affected by management under this alternative. Contributing to this is that alternative B would allocate lands to only one of the potential special recreation management areas, thus eliminating development of additional major recreation sites and facilities associated with special recreation management area allocation and management. During the short term, some prescribed management activities would probably adversely affect recreation experiences of forest visitors. These activities are primarily the estimated 67 timber harvest units totaling nearly 700 acres and the estimated 2.62 miles of new access roads within one-half mile of the district's developed and potential recreation sites. There would be an adverse long-term impact associated with management if the following occurred: timber harvest within or in proximity to potential recreation sites not developed and maintained under alternative B during the short term, thus diminishing the sites' values for development and management in the future.

Under alternative C, projected demand would be met for all recreation uses in the short term except for nonmotorized travel activities requiring developed trails. Four of the district's seven existing trails would be closed and only one of 11 potential trails would be developed under this alternative. Visitor experiences would be adversely affected. Recreation-related opportunities dependent on a developed trail system would be sought on lands managed by other government agencies and/or the private sector. Concerning all other recreation uses, management actions carried out under this alternative would not adversely affect the experiences of forest visitors.

Under alternatives D, E, and the proposed resource management plan, projected demand for all recreation uses during the short term would be met. Management actions carried out under these alternatives would not adversely affect the recreation experiences of forest visitors.

Effects on Timber Resources

Timber is an important component of the resources managed by the BLM in western Oregon. Each of the seven alternatives described in chapter 2 would affect BLM's timber resource and its availability for harvest in a different way. The alternatives directly affect the age, size, type, distribution, and productivity of the district's timber stands and the way they would change over time. The alternatives could also result in different levels of forest health and responses to disturbances such as fire, wind, insects, or disease, which in turn affect the long-term timber production of the forest.

Quantifiable Effects

The most quantifiable differences in effects between alternatives are:

- acres of land available for timber production;
- probable sale quantity;
- acres harvested per decade;
- acres of forest land converted to roads; and
- age class distribution of the future managed forest.

Each of these effects is discussed in the following sections.

Acres of Land Available for Timber Production

The suitability of land for timber production is determined through the Timber Production Capability Classification inventory, which is described in the Timber Resources section of chapter 3. Sites considered suitable for timber production include two categories: suitable commercial forest land and suitable woodland. Suitable commercial forest land is considered suitable to manage for a sustained yield of commercial conifer species. It is included in the land base used for probable sale quantity calculations unless excluded for the benefit of other resources. Suitable woodland is generally not included in calculations of probable sale quantity. However, under alternatives A, B, and C, some suitable woodland is included in the acreage available for harvest. These are sites with increased reforestation difficulty or lower site quality, or sites considered capable of producing commercial hardwoods but not conifers.

Where suitable commercial forest land is allocated for protection or enhancement of nontimber resource values, the number of acres available for timber production is reduced. This, in turn, results in a lower probable sale quantity. In approximate terms, every thousand acres of land allocated to timber production (under the proposed resource management plan) adds approximately 700,000 board feet to the annual probable sale quantity for the Salem District.

Appendix BB describes the process used to calculate the acres available for timber harvest, and displays a summary of the acreage allocations for the proposed resource management plan. Table 2-1 displays the acres available for intensive management, constrained management, and management for enhancement of other uses for each alternative.

Probable Sale Quantity

The probable sale quantity depends on the number of acres allocated to timber production, the intensity of timber management, the sustained yield capacity of the land, and the initial volume and age-class distribution of the timber stands. The level of yield may be constrained by any of the following:

- land use allocations established for the benefit of other resources;
- economic feasibility of management and harvest;
- limitations on timber management practices; and
- minimum harvest size or age standards.

The Trim-Plus computerized harvest scheduling model was used to estimate the probable sale quantity for all alternatives except no action and D. For the proposed resource management plan, the Trim-Plus model was used only for the General Forest Management Area allocation. Trim-Plus projected the age, size, and cubic foot volume of timber that could be harvested each decade for up to 20 decades. For alternative D, the 50-11-40 rule was used to model the probable sale quantity. Estimates for the no action alternative were based on the allowable sale quantity developed for the current (1980s) planning cycle, for which the SIMIX model was used.

Table 4-1 displays the probable sale quantity in both cubic feet and Scribner board feet for each alternative. The probable sale quantity is highest under alternative A and lowest under the proposed resource management plan, with the other alternatives arrayed between them.

Table 4-20 displays the probable sale quantity in cubic feet and Scribner board feet for decades 1, 2, 3, 5, and 10, for each alternative. The cubic feet volumes are constant from decade to decade for all alternatives except the proposed resource management plan. The reason for the decadal variation under the proposed resource management plan is explained in appendix BB.

The prescriptions for alternative C and the proposed resource management plan call for retention of a portion of the stand at harvest, development of stands with multiple canopy layers, maintenance of wider tree spacing through a series of density management cuttings, and management on longer rotations. These practices are intended to permit portions of the forest to develop late-successional forest characteristics at an accelerated rate. There is currently little available research that quantifies the expected timber yields from such stand management regimes. The level of confidence in the resulting probable sale quantity is therefore reduced.

The probable sale quantity could increase in future decades as the forest progresses towards a balanced age-class distribution of timber (i.e., a regulated forest) on lands available for timber management. When a regulated forest is achieved, the probable

sale quantity would equal the long-term sustained yield capacity of the district's available forest lands. Because of the nontraditional silvicultural and forest management strategies proposed for alternative C and the proposed resource management plan, the classic concept of a regulated forest with a balanced age class distribution does not readily apply to those alternatives.

Timber stand growth is said to have culminated when merchantable volume divided by stand age peaks, reaching its highest potential level. For the short term, harvest of timber stands younger than the age of culmination, as proposed in alternatives no action, A, B, and E, would permit harvest of a greater probable sale quantity. For the long term, however, harvesting below the age of culmination would delay the time required for stands to reach their long-term sustained-yield capacity.

Under alternative C and the proposed resource management plan, some timber harvest volume, in addition to the calculated probable sale quantity, would be removed as partial cuttings from the blocks of land designated for restoration and retention of mature and old-growth forest (alternative C) or Late-Successional Reserves (proposed resource management plan). Such partial cuttings would be designed

Table 4-20 Probable Sale Quantity of the Alternatives and Board Foot Equivalent by Decade

Alternatives	Volume by Decade Million Cubic Feet / Million Board Feet				
	Decade 1	Decade 2	Decade 3	Decade 5	Decade 10
NA	37.21 / 239.2	37.21 / 240.0	37.21 / 237.0	37.21 / 234.1	37.21 / 232.9
A	51.92 / 333.9	51.92 / 324.7	51.92 / 316.0	51.92 / 303.9	51.92 / 292.1
B	43.86 / 280.5	43.86 / 271.5	43.86 / 263.4	43.86 / 255.2	43.86 / 247.3
C	17.14 / 107.0	17.14 / 104.5	17.14 / 104.2	17.14 / 103.8	17.14 / 108.7
D	17.26 / 106.7	17.26 / 104.4	17.26 / 103.9	17.26 / 103.4	17.26 / 101.7
E	20.14 / 127.1	20.14 / 121.8	20.14 / 119.6	20.14 / 117.6	20.14 / 114.6
PRMP	5.72 / 34.8	5.60 / 33.8	5.89 / 35.3	5.53 / 35.7	5.41 / 32.7

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Sources: Management Framework Plan records and Trim-Plus output files.

to promote development of late-successional forest characteristics in younger stands located within the restoration and retention blocks or Late-Successional Reserves. Some harvest may also result from salvage following a catastrophic event such as wildfire or windstorm. This additional harvest volume cannot be predicted and is not included in the computation of the probable sale quantity.

Alternative 9 of the SEIS estimated the probable sale quantity for the Salem District to be 43.6 million board feet (short log). The district calculation of the probable sale quantity is 34.8 million board feet. The 20 percent difference is attributable to a change in the acreage base. Additional acres in first and second order intermittent streams are excluded from timber harvest in the probable sale quantity calculation by the district.

Appendix BB describes the probable sale quantity computation process.

Sensitivity analysis was used to estimate the effect on the probable sale quantity for the proposed resource management plan if some of the assumptions used in making the calculation were changed. Results of these analyses are as follows:

- If the available forest lands within Key Watersheds were not included in harvest calculations, the probable sale quantity for the district would decrease by 8.9 percent;
- If the available forest lands within areas currently defined as critical habitat for the northern spotted owl were not included in harvest calculations, the probable sale quantity would decline by 12.2 percent; and
- Under the proposed resource management plan, a number of silvicultural practices would be applied to forest stands, principally in the General Forest Management Area. These practices include precommercial thinning, forest fertilization, and use of genetically-selected seed for reforestation. Increased yields from such treated stands contribute to the calculation of probable sale quantity. Probable sale quantity for the Salem District would be reduced by 0.5 percent if these practices were not used.

Acre Harvested Per Decade

In general, the number of acres that receive regeneration harvest treatments each year is related to the planned rotation length. For example, with an 80-year rotation on a regulated forest, annual regeneration harvest acreage should equal approximately 1/80 of

the total regulated acres. Under alternatives C, D, and the Connectivity/Diversity Blocks of the proposed resource management plan, which would employ rotations ranging from 150 to 300 years, the annual acreage of regeneration harvest would be much smaller than for the shorter rotations of the other alternatives.

Acre of Forest Land Converted to Roads

Construction of new permanent roads, landings, and rock quarries would reduce the total acres of land available for timber production. Roads would be constructed as necessary to provide access to BLM timber sale areas and to adjacent lands owned by others under the terms of reciprocal right-of-way agreements or permits. The reduction in forest land acreage resulting from road construction would continue for several decades until all roads necessary to manage lands allocated to timber production were constructed. The length of time and total amount of road would vary by alternative.

A greater amount of land would eventually be occupied by permanent roads under alternatives no action, A, and B, which have the largest allocations of land to timber production. Table 4-21 displays the mileage and acres occupied by new roads for the first, second, and third decades of the plan, for each alternative. The acreage includes areas such as the road surface, ditches, turnouts, landings, cut slopes, and fill slopes, if those areas would be taken out of production. Dedication of land to permanent roads has an unavoidable adverse effect of removing land from production of timber products. On the other hand, roads are necessary to provide access for management purposes such as reforestation, stand maintenance, fire protection, and monitoring.

Under all alternatives, the loss of timber production acres would be minimized by:

- careful advance planning to make effective use of available logging systems to minimize the total length of road system needed;
- building roads only to the minimum standard required for the expected use of each road; and
- avoiding unnecessarily-wide clearing limits in road design and construction.

Under the proposed resource management plan, miles of new road construction in Key Watersheds would be matched by an equivalent mileage of road closures.

Table 4-21 Estimated Annual Miles and Acres of New Road Construction

Alternative	Decade					
	First		Second		Third	
	Miles	Acres	Miles	Acres	Miles	Acres
NA	11	59	13	73	15	83
A	16	87	17	95	19	101
B	12	64	13	68	13	73
C	18	96	13	72	20	108
D	9	50	10	55	11	61
E	8	46	9	50	10	52
PRMP	5	26	5	26	5	26

Existing Roads: 2,882 miles; 15,707 acres.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Ten-year timber management scenario.

Age Class Distribution of the Future Managed Forest

The age at which timber stands are harvested has a direct impact on the age and size characteristics of the future forest. Under all alternatives except C, the average age and diameter of harvested trees on most intensively-managed lands would decline significantly over the first few decades but then slowly increase as the forest approaches regulation. Under alternatives A and B, intensively-managed lands would take longer to reach regulation; harvest of smaller trees would continue for a longer period than it would under the other alternatives. Such delays in reaching culmination would significantly postpone the time for the managed forest to reach its maximum productive capacity.

Under alternative C, a large number of acres would be managed on rotations of 150 to 300 years, and under the proposed resource management plan, a large number of acres would be managed as Late-Successional Reserves, Riparian Reserves, or Connectivity/Diversity Blocks. Thus, under alternative C and the proposed resource management plan, BLM-administered lands would contain many more acres of late-successional forest in the future than under alternatives A and B, which have shorter rotations.

Less Quantifiable Effects

Some effects that are not easily quantifiable between alternatives are listed and discussed below:

- Adaptive Management Areas;
- retention of green trees and dead-and-down material;
- risk of insects and disease;
- wood quality of harvested trees;
- reforestation;
- genetic selection;
- stand management practices;
- land exchanges;
- adjustment of Riparian Reserves; and
- long-term site productivity.

Adaptive Management Areas

Adaptive management areas are unique to the proposed resource management plan; therefore, no comparison can be made with the other alternatives. Management activities in these areas will be conducted to achieve the objectives as described in chapter 2. The area outside of reserves in the Northern Coast Range Adaptive Management Area has been modeled with an emphasis on thinning. Since

the management strategy to meet the objectives of the Adaptive Management Area is not prescribed and is left open to local innovation, the probable sale quantity associated with the Adaptive Management Area is uncertain. The Adaptive Management Area will ultimately have a plan that will include a short-term (three to five year) timber sale plan and long-term yield projections.

Retention of Green Trees and Dead-and-Down Material

Under alternatives C, D, E, and the proposed resource management plan, some live trees, snags and down logs would be retained within harvested areas. In most cases, these trees would never be removed, but would provide a source of snags and structural diversity for the future forest. The number of trees retained varies by alternative and from one land use allocation to another within alternative C and the proposed resource management plan.

Where merchantable live trees and downed logs are reserved within harvest areas, there is a reduction in yield due to the portion of volume that is not removed. In addition, retained live trees will compete with the young forest growing beneath them, reducing future yields to some degree. In Trim-Plus model simulations, harvest yields were reduced to account for trees being retained on harvested units and to allow for reduced growth due to competition of an overstory.

When trees are retained that display characteristics such as limbiness, excessive taper, or crooks and forks, there is a potential for those traits that are genetically determined to be transmitted to subsequent stands.

Risks of Insects and Disease

Silvicultural practices used to achieve management objectives could lead to increased incidence of insects and diseases and subsequent loss of yield. Risks include:

- Green tree retention regimes have a higher potential to spread diseases from existing infected trees to regenerated trees than clearcutting;
- Thinning or partial cutting can result in physical damage to the remaining trees, especially on steep or broken terrain. This may predispose the reserved trees to insect or disease attack, leading to reduced yield and value. Risk of damage increases when the silvicultural system requires several entries into stands;

- Thinning entries can spread black stain fungus (*Verticicladiella wagenetii*), especially in stands with soil compaction that resulted from previous tractor logging; and
- Spread of the laminated root rot fungus (*Phellinus weirii*) may be accelerated by intensive management regimes such as those proposed for alternatives no action, A, and B. Under all of the alternatives, identified infection sites would be replanted with tree species which are resistant or immune to the disease. However, the disease may continue to spread from infected areas that are not detected prior to planting.

Wood Quality of Harvested Trees

Wood quality refers to the physical characteristics of harvested logs and their suitability to produce valuable wood products. The most important wood quality factors are log size; wood density and strength; number, size, and type of knots; and proportion of juvenile wood.

Under alternatives no action, A, B, E, and in the General Forest Management Area under the proposed resource management plan, timber management practices are designed to maintain well-spaced stands and rapid growth, with harvests scheduled on short rotations (60 to 110 years). This combination of factors is likely to result in the production of wood of lower quality and value per unit volume in the future than under the longer rotations of alternatives C and D and in the Connectivity/Diversity Blocks of the proposed resource management plan.

Under alternatives C and D and in the Connectivity/Diversity Blocks under the proposed resource management plan, some timber stands would be managed at wider spacings than under the other alternatives. Trees grown under such regimes are expected to develop very large diameters, but are also likely to be limby and produce low-to-medium density wood, large knots, and a large core of juvenile wood (see appendix X for additional discussion).

Reforestation

Under all alternatives, harvested areas would usually be reforested within one growing season after site preparation, with an adequate number of seedlings of desired tree species. Reforestation estimates do not project full stocking to target levels on all harvested acres, but assume that high levels of reforestation success will continue.

Under alternatives no action, A, B, D, E, and in the General Forest Management Area under the proposed resource management plan, most regeneration would consist of planted tree seedlings. Under alternative C and the Connectivity/Diversity Blocks in the proposed resource management plan, a greater amount of natural regeneration would be expected. Retained trees left in the harvested units would provide a close seed source for natural regeneration.

Genetic Selection

Under all alternatives except C, genetically-selected seedlings would be planted following regeneration harvest, to the extent that selected seed is available. Under alternative C, genetically-selected seedlings would comprise not more than half of the trees planted following regeneration harvest.

Reforestation efforts have the potential to change the genetic makeup of forest stands, whether seedlings were produced through a genetic selection program, obtained from general seed collection, or established naturally from seed trees left on the area. By controlling the parental makeup of seed lots, planting of seedlings well adapted to local conditions can be reasonably assured. Seed from the live trees retained within harvest units under alternative C and the proposed resource management plan would add to the genetic diversity of the regenerated stands.

Tree selection and breeding programs have been designed to prevent excessive narrowing of gene pools or the complete loss of any genetic traits. Moreover, genetic selection may provide the only viable method of protecting genetic material in species such as western white pine or sugar pine, which are highly susceptible to the white pine blister rust fungus.

Under all alternatives, a network of native trees would remain scattered throughout the landscape in Riparian Reserves, fragile areas, and administrative withdrawals. These trees would continue to contribute seed to future stands. This provides some assurance that the locally adapted genetic pool would not be lost.

Use of genetically-selected trees is expected to result in accelerated growth rates and earlier attainment of merchantable trees sizes, as well as more rapid development of late-successional forest structure. Under all alternatives except C and the proposed resource management plan, the probable sale quantity reflects anticipated future yield increases from stands grown from genetically-selected seed.

Under the proposed resource management plan, yield gains due to genetic selection are attributed only to the General Forest Management Area allocation.

See appendix L for a more complete discussion of the forest genetics program.

Stand Management Practices

A variety of intensive stand management practices would be implemented under every alternative. Appendix BB displays the projected acres of each practice by decade and alternative. These acreage figures have been estimated for the purpose of analyzing potential environmental impacts. Actual acres of each type of harvest and stand treatment would vary by year in the course of implementing the plan.

The anticipated effects of the stand management practices that would be implemented are described below:

- **Precommercial Thinning** Overstocked young stands would be precommercially thinned under all alternatives on sites allocated to timber production. Under alternative C and the Connectivity/Diversity Blocks of the proposed resource management plan, precommercial thinning would be designed primarily to promote density management objectives.

Precommercial thinning helps to maintain stand vigor by increasing growing space, eliminating poorly formed or undesirable trees, reducing root competition, and delaying crown closure. Thinned stands produce larger diameter trees than stands that are overstocked.

There may be some negative effects. For instance, thinning can promote the spread of black stain fungus, especially in stands where soil compaction has occurred. Thinning slash places a stand at increased risk of fire for several years.

Overall, precommercial thinning usually results in an increase in yield, promotes earlier development of a merchantable stand, provides an opportunity to control density and species composition, and eliminates poorly formed and diseased trees early in the life of the stand.

- **Commercial Thinning** Commercial thinning, or density management harvest, is planned under all of the alternatives. Under alternatives no action, A, B, D, E, and the General Forest Management Area portion of the proposed resource management plan, commercial thinning would be applied to young, well-stocked stands.

Up to 60 percent of such young stands would be suitable for thinning based on inventory data, topography, location, density of trees, road locations, and other site-specific information.

Commercial thinnings can produce an increase in total net yield and result in a higher probable sale quantity. The yield increase results from early harvest of merchantable trees which otherwise would have died and become unusable before final harvest of the stand. The increased probable sale quantity is a result of a combination of favorable timing of intermediate harvests and a higher total yield over a rotation. Depending on spacing of residual trees, thinning also can result in production of larger trees with higher stumpage values and lower logging costs at regeneration harvest.

In the Connectivity/Diversity Blocks of the proposed resource management plan and under alternative C, density management harvest in young stands would increase the rate at which large trees, multiple canopy layers, and structural diversity are produced in these stands.

Thinning, if not carefully implemented, can damage the tops, crowns, bark, and roots of residual trees. Such damage reduces wood quality and increases the risk of insect and disease attacks. Commercially-thinned stands, particularly those not subjected to prior spacing management through precommercial thinning, may be more susceptible to windthrow, depending on their locations.

- **Forest Fertilization** Fertilization of some managed stands would take place under all of the alternatives. Effects would include higher growth rates, earlier production of merchantable trees, and increased resistance to insects and disease. Also, under alternatives no action, A, B, D, and E, and in the General Forest Management Area under the proposed resource management plan, the probable sale quantity would reflect expected future gains resulting from fertilization. No gains would be projected under alternative C or in the Connectivity/Diversity blocks of the proposed resource management plan, where stands are managed on long rotations.
- **Vegetation Control** Under all alternatives, competing vegetation would be managed as provided by the record of decision for BLM's management of competing vegetation program (see appendix I-C of the draft resource management plan). The effects of vegetation management would be more rapid re-establishment of forest

conditions, a greater total yield of timber from each acre, and a correspondingly higher probable sale quantity.

The timber yields that have been projected are dependent upon successful control of competing vegetation, whatever method is employed. For purposes of growth and yield projections, it was assumed that effective methods of vegetation control would be available and would be implemented as needed. These methods could include prescribed fire and manual or mechanical methods as appropriate. Use of herbicides may occur but is not considered likely.

- **Pruning** In the proposed resource management plan, pruning of managed stands could occur in suitable stands where a positive present net value would be expected. Pruning at least the first log approximately ten years after precommercial thinning could produce lumber that has tight knots or is knot-free, and would also reduce the proportion of juvenile wood. The lower occurrence of knots and juvenile wood characteristics would result in a higher quality product. Pruned stands could also have a reduced risk of crown fires once the pruned limbs have decayed.

Land Exchanges

Under all alternatives, efforts would be made to negotiate land exchanges that would promote more efficient management of BLM-administered lands. When land exchanges result in acquisition of lands that would be allocated to timber production, the projected probable sale quantity may change, depending on site conditions, acreages, change in timber inventory, and changes in age class distribution. Any exchanges of commercial timberland for tracts which would be allocated to nontimber uses would result in a decrease in the probable sale quantity.

Adjustment of Riparian Reserves

Under the proposed resource management plan, the prescribed widths of Riparian Reserves are intended to be interim until the completion of watershed analysis. Following watershed analysis, the Riparian Reserve widths for permanently-flowing streams are expected to remain similar to those prescribed in the proposed resource management plan. However, Riparian Reserve widths for intermittent streams may be different from those prescribed in the proposed resource management plan. These adjustments of Riparian Reserve widths could increase or decrease the available acres of Connectivity/Diversity Blocks

and General Forest Management Area. This, in turn, would result in an increase or decrease in the probable sale quantity.

It is also possible that watershed analysis could indicate the need to defer harvest in some watersheds for one or more decades. Such deferral could result in a change in the calculated probable sale quantity.

Long-term Site Productivity

Some researchers suggest that long-term site productivity may not be sustainable under intensive management regimes such as those proposed for alternatives no action, A, and B. Soil fertility may be diminished over time by repeated cycles of harvest, site preparation, and control of competing vegetation (Perry and Maghembe 1989).

The FORCYTE-11 model was used to predict long-term site productivity under several proposed management regimes. The model generally indicates that site productivity can be maintained if harvest rotations are at least 60 years, harvested areas are not burned or burns are of light intensity, and stands are fertilized during each rotation.

Under all alternatives, most broadcast burning is expected to be of light-to-moderate intensity, and many harvest areas would be reforested without burning. Under alternative C and the proposed resource management plan, harvest ages vary from 60 to 300 years and in almost all cases would not reduce long-term site productivity. For additional information on long-term site productivity, see the Effects on Soils section in this chapter.

Other potential impacts to long-term site productivity are being studied by the scientific community. Specific and conclusive results are not yet available, but some important observations appearing in scientific literature are listed below:

- Use of shorter rotations appears to lead to more rapid depletion of nitrogen in forest soils. Nitrogen depletion would result in a reduction of long-term site productivity unless mitigated by periodic application of nitrogen fertilizer to the site;
- Use of harvest treatments such as clearcutting or low-density management, which tend to increase temperature regimes at the soil surface, could reduce long-term site productivity. This reduced productivity results from loss of soil nitrogen (Borchers et al. 1990) and from loss of important soil mycorrhizae (Parke et al. 1983); and

- Silvicultural regimes which reduce tree species diversity may also have an adverse impact on long-term site productivity. Studies indicate that the growth of beneficial mycorrhizal fungi and other nitrogen-fixing soil organisms is associated with the presence of certain hardwood species (Borchers and Perry 1990, Amaranthus and Perry 1990).

Timber Supply

An analysis of projected timber supply for the Salem District, (U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station 1992b) modeled the available timber supply from each of the ownership categories in western Oregon. Timber supply from BLM-administered lands under each alternative was included. The overall economic timber supply for the periods 1993-2000 and 2001-2010 was estimated. In this process the private timber supply was adjusted to account for price changes attributable to the different levels of BLM timber supply by alternative. The results are displayed in tables 4-25 and 4-26. The first table shows timber supply for the district, while the second table shows the same data for all of western Oregon. Because this model has not been validated its predictive capability is uncertain. However, it is useful for comparison of alternatives.

During the first decade, total timber supply in the district would decline under all alternatives compared to the 1984-1988 baseline period. The percent change in the timber supply would range from minus 14 under alternative A to minus 20 percent under the proposed resource management plan. Even under alternative A, overall timber supply would not increase in spite of a 30 percent increase in BLM timber harvest. This would principally be due to a decrease in harvest on the national forests attributable to the SEIS record of decision.

During the second decade, overall timber supply in the district would increase above the baseline level except under the proposed resource management plan. The increase would result from larger quantities of timber on private lands becoming available for harvest.

The cumulative effects of the alternatives are shown in table 4-26. This table shows projected timber harvests for all of western Oregon, based on the assumption that each BLM district adopts the same alternative. The table does not include harvests in Klamath County because BLM's share of total harvests there is very small. Compared to the 1984-1988 baseline, harvest of timber from western

Table 4-25 Salem District Timber Harvest

Timber Harvest 1993-2000 (millions of cubic feet per year)

Supplier ¹	1984-1988	Alternatives						
	Baseline	NA	A	B	C	D	E	PRMP
BLM ²	40	37	52	44	17	17	20	6
Forest Service ³	138	21	21	21	21	21	21	21
Private (Industrial and non-Industrial)	289	327	323	325	336	336	338	339
Other public	47	47	47	47	47	47	47	47
Total	514	433	443	437	422	421	426	413

Timber Harvest 2001-2010 (millions of cubic feet per year)

Total	514	531	543	536	516	516	515	506
-------	-----	-----	-----	-----	-----	-----	-----	-----

Timber Processed 1993-2000 (millions of cubic feet per year)

Total ⁴	518	438	450	444	426	426	430	418
--------------------	-----	-----	-----	-----	-----	-----	-----	-----

¹ NonBLM supply partitioned on county boundaries to approximate the BLM district.

² Baseline data from U.S. Department of the Interior, BLM, OSO various years. Converted from board feet using a factor of 6.2 board feet per cubic foot.

³ Assumes implementation of the President's Forest Plan.

⁴ Timber processed from all sources was partitioned on county boundaries to approximate the BLM district. This analysis accounts for historic patterns of log flows across county boundaries. Assumes all BLM districts have implemented the same alternative. Includes logs exported overseas.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station 1992 (revised 1994).

Table 4-26 Western Oregon Timber Harvest¹

Timber Harvest 1993-2000 (millions of cubic feet per year)

Supplier	1984-1988	Alternatives						
	Baseline	NA	A	B	C	D	E	PRMP
BLM	199	187	250	224	67	74	56	35
Forest Service ²	376	60	60	60	60	60	60	60
Private (Industrial and non-Industrial)	603	618	610	614	634	634	638	640
Other public	62	62	64	64	64	64	64	64
Total	1,240	927	984	962	825	832	818	799

Timber Harvest 2001-2010 (millions of cubic feet per year)

Total	1,240	1,068	1,124	1,102	959	964	947	928
-------	-------	-------	-------	-------	-----	-----	-----	-----

Timber Processed 1993-2000 (millions of cubic feet per year)

Total ³	1,294	987	1,049	1,019	886	892	876	858
--------------------	-------	-----	-------	-------	-----	-----	-----	-----

¹ Totals do not include Klamath Falls Resource Area.² Assumes implementation of the President's Forest Plan.³ Timber processed from all sources was partitioned on county boundaries to approximate BLM districts with the exception of the coastal portion of Douglas County which was included in the Coos Bay District. This analysis accounts for historic patterns of log flows across county boundaries. Assumes all BLM districts have implemented the same alternative. Includes logs exported overseas.

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station 1992 (revised 1994).

Oregon BLM-administered lands in the period 1993-2000 would range from a 26 percent increase under alternative A to an 82 percent decrease under the proposed resource management plan. During the 2001-2010 period, total harvests would increase relative to the preceding period even though BLM and national forest harvests would not. This would again be due to increased harvest on private lands.

The supply of timber in western Oregon also affects the quantity of wood processed in the lumber and wood products industry. Inflows and outflows of logs affect the amount of wood actually processed in the district. The amount of timber processed in the Salem District during the 1993-2000 period would decrease under all alternatives. Differences between the amounts processed under different alternatives may be attributed to the difference in harvest levels between alternatives. The amount of wood processed includes logs exported overseas.

Because a portion of the raw logs harvested in the district is processed outside the district, the changes in available supply would affect areas outside the district also, but to a lesser degree.

Conclusions

Alternative A would allocate the most land to timber production and would provide the highest probable sale quantity for the short term. However, long-term productivity would be reduced in two ways. First, harvest of stands substantially younger than the age of culmination of mean annual increment would cause a significant loss in future productivity. Second, the short-rotation regimes proposed for alternative A may have detrimental effects on maintenance of soil fertility and structure. This would reduce future growth and yield.

Alternatives B, D, and E would provide for a timber management regime similar to that of alternative A. However, the land base would be slightly reduced in alternative B, and substantially reduced in alternatives D and E. None of these options would provide optimum management for the timber resource.

Under alternative C, designation of old growth restoration and retention blocks would exclude from harvest about 17 percent of the acres that would otherwise be available for timber production. This, combined with the high levels of overstory retention on the available acres, would result in a level of harvest well below the forest land's potential.

From a timber production standpoint, the proposed resource management plan does not optimize the timber resource because of the large amount of land excluded from scheduled timber harvest within Late-Successional Reserves and Riparian Reserves, and because of long rotations and other limitations within the Connectivity/Diversity Blocks. However, the regime proposed for the General Forest Management Area allows for application of intensive timber management practices while maintaining a rotation length that would be sufficient to protect and sustain the productivity of the soil resource.

Effects on Energy and Mineral Resources

The allocations and management prescriptions of the alternatives would affect availability of land for exploration and development of energy and mineral resources. This would be done by imposing restrictions on leasable, locatable and salable mineral activity. To assess these effects, restrictions have been divided into five categories:

- non-discretionary closures;
- discretionary closures
- no surface occupancy stipulations;
- standard stipulations; and
- additional restrictions, such as controlled surface use and timing limitations.

Discretionary closures are determined by the BLM, and nondiscretionary closures are imposed by law, regulation or secretarial or executive order.

The variations in restrictions by alternative are summarized in tables 4-22 through 4-24. Alternatives no action and A propose the least constraints on minerals, while alternatives B through E, and the proposed resource management plan propose the most restrictions.

Existing claims, leases, and salable mineral developments would not be affected by alternatives no action through E. Under the proposed resource management plan, existing mineral interests would be restricted in Riparian Reserves and possibly Late-Successional Reserves and Key Watersheds (see chapter 2, Proposed Resource Management Plan). These restrictions may eliminate continued development of some energy and mineral resources.

The impacts of the alternatives on leasable mineral exploration and development are considered minor. During the expected ten-year life of the plan, the highest potential for development of leasables would be in or near the Mist gas field. Some very limited development could occur on federal lands near Mist (see appendix DD). If it does, restrictions on development would be limited to controlling surface uses on steep slopes and no surface occupancy in Riparian Reserves.

In the remainder of the planning area, the potential for exploration and development of leasable minerals is mostly low to moderate. If interest in leasing occurs, areas with special resource values would be protected by stipulations such as no surface occupancy (see appendix M). Most of the areas are small and have extensive roads nearby to facilitate off-site drilling.

Although future exploration and development of locatable minerals would be excluded or restricted in some areas under all alternatives, this is not considered a major impact due to the limited potential for

occurrence throughout most of the planning area. Eighty percent of BLM-administered land has no known potential for locatable minerals.

Development of locatable minerals is expected to remain minimal during the next ten years, with only minor surface-disturbing activity. No mining plans (exceeding five acres) are expected.

Development of salable minerals would occur mainly at existing sites. Development of new sites would meet all applicable environmental laws and would not impact resources of special interest such as areas of critical environmental concern, recreation sites, and threatened and endangered species habitat.

The irreversible and irretrievable commitment of resources would be the amounts of mineral commodities actually removed from the public lands.

Table 4-22 Leasable Mineral Restrictions (acres) by Alternative

Restrictions	Mineral Potential	Alternatives						
		NA	A	B	C	D	E	PRMP
Closed:	High	400	400	400	400	400	400	400
Non-	Moderate	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Discretionary	Unknown/Low	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Closed:	High	0	0	0	0	0	0	0
Discretionary	Moderate	100	100	100	100	100	100	100
	Unknown/Low	0	0	0	0	0	0	0
Open:	High	500	2,200	5,200	6,500	11,000	17,200	14,300
No Surface	Moderate	4,600	18,700	44,500	56,300	95,200	148,700	123,400
Occupancy	Unknown/Low	3,100	12,600	30,000	37,900	64,000	100,100	83,400
Open:	High	24,500	21,800	18,700	17,400	12,300	5,000	3,200
Standard	Moderate	212,000	188,500	161,500	150,300	106,600	43,000	27,000
Stipulations	Unknown/Low	142,700	126,800	108,700	101,100	71,700	29,000	18,600
Open:	High	0	1,100	1,200	1,200	1,700	2,900	7,900
Additional	Moderate	0	9,400	10,500	10,000	14,900	24,800	68,100
Restrictions	Unknown/Low	0	6,300	7,100	6,700	10,000	16,700	46,000

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base and Salem District resource specialists.

Table 4-23 Locatable Mineral Restrictions (acres) by Alternative

Restrictions	Mineral Potential	Alternatives						
		NA	A	B	C	D	E	PRMP
Closed:	High	900	900	900	900	900	900	900
Non-	Moderate	300	300	300	300	300	300	300
Discretionary	Unknown/Low	4,900	4,900	4,900	4,900	4,900	4,900	4,700
Closed:	High	200	200	400	400	600	700	2,400
Discretionary	Moderate	100	100	100	100	200	200	700
	Unknown/Low	1,100	900	2,100	2,300	3,400	3,700	13,100
Open:	High	56,000	54,800	53,500	52,900	50,700	47,500	7,100
Standard	Moderate	17,300	16,900	16,500	16,300	15,600	14,600	2,200
Requirements	Unknown/Low	312,700	306,100	298,400	295,300	283,100	265,200	39,900
Open:	High	0	1,200	2,400	2,900	4,900	8,100	47,500
Additional	Moderate	0	400	700	900	1,500	2,500	14,600
Requirements	Unknown/Low	100	6,900	13,400	16,400	27,500	45,000	264,700

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base and Salem District resource specialists.

Table 4-24 Salable Mineral Restrictions (acres) by Alternative

Restrictions	Mineral Potential	Alternatives						
		NA	A	B	C	D	E	PRMP
Closed:	High	0	0	0	0	0	0	0
Non-	Moderate	100	100	100	100	100	100	100
Discretionary	Unknown/Low	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Closed:	High	0	0	0	0	100	100	600
Discretionary	Moderate	100	100	200	200	400	400	2,800
	Unknown/Low	8,200	9,800	15,000	16,700	28,800	28,600	217,000
Open:	High	1,000	900	800	700	500	200	100
Standard	Moderate	4,800	4,300	3,600	3,400	2,400	1,000	600
Requirements	Unknown/Low	373,400	331,800	284,200	264,400	187,200	75,000	48,300
Open:	High	0	100	200	300	400	700	300
Additional	Moderate	0	500	1,100	1,300	2,100	3,600	1,600
Requirements	Unknown/Low	0	40,000	82,400	100,500	165,600	277,900	120,700

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

Source: Western Oregon Digital Data Base and Salem District resource specialists.

Effects on Socioeconomic Conditions

Commodity Uses

Commodity uses of BLM-administered lands and resources generate measurable economic activity within and beyond the Salem District. Each alternative analyzed in this proposed resource management plan includes varying land allocations and management actions/direction that would alter the production of commodity outputs and other natural resource values associated with BLM-administered lands (see table 4-27 for a list of these uses and related economic contributions by alternative).

No estimates have been made of the economic contributions to local personal income and employment by possible developments such as mining and hydroelectric projects. The timing, duration, and degree of such developments are speculative and cannot be estimated at reasonably accurate levels given current information. Commercial fish production attributable to BLM-administered streams is not expected to change during the life of the plan and is also omitted from the projections of economic contribution.

In addition to commodity uses, natural resources have values that do not generate measurable economic activity. These nonmarket values include water quality and quantity, environmental education, cultural resources, threatened and endangered species habitat, and nongame wildlife habitat. These values are held by people who want certain resources or opportunities to remain available on BLM-administered lands. Nonmarket values are to some extent reflected in changes in visitor use, but are not sufficiently quantifiable to be compared to other values in the socioeconomic analysis.

Timber

Timber markets within the Pacific Northwest region have undergone significant changes since the 1984-1988 baseline period. Two forces particularly relevant to federal timber supply and stumpage price are the curtailment of federal timber sales due to court injunctions and the adoption of the SEIS record of decision by the Secretaries of Agriculture and the Interior, and thus the Forest Service and the BLM. The curtailment of federal timber sales within the

range of the northern spotted owl resulted in forest industry reliance on sales remaining under contract for federal timber harvest since 1992. This volume is now essentially exhausted on the lands of both agencies.

The April 1994 SEIS record of decision projected future timber harvest levels significantly lower than those identified in the Forest Service's forest plans and the BLM's 1992 draft resource management plans in western Oregon. Any substantial change in timber supply could be expected to affect timber stumpage prices within the range of the northern spotted owl. The size of changes in federal timber harvests considered in the SEIS record of decision was much larger than the changes in BLM harvests analyzed in this proposed resource management plan.

Future timber price projections were required in this proposed resource management plan to conduct portions of the analysis relating to employment, income, and county revenues. This proposed resource management plan assumes under all BLM alternatives that the SEIS record of decision is implemented on all of the affected national forests. The result is higher future stumpage price estimates than in the 1992 draft resource management plan. For a complete description of the price estimation process, consult draft resource management plan appendix 4-M.

Multiple factors have combined to cause significant price changes since the baseline period. In general, the price variation among alternatives is expected to be minimal. The most significant change was between the baseline period and the 1993-2000 period. Future variations in BLM timber harvest, when examined alone, would have only marginal impacts on stumpage prices. Although price is one important market component that has changed, timber market structures are also undergoing change.

Alternatives C, D, E, and the proposed resource management plan, reduce BLM timber harvest below historic levels. Reductions in BLM harvests, combined with reductions in Forest Service harvest levels, would reduce federal timber supplies in the Pacific Northwest. Although increased harvest levels on private land (industrial and nonindustrial) would mitigate a portion of this reduction, an overall reduction in Pacific Northwest timber supply is expected. Analyses using the CINTRAFOR Global Trade Model indicate that reduced timber supply in the Pacific Northwest would be offset by a combination of reduced demand for wood products and additional supplies from other areas in the United States and

Table 4-27 Summary of Measurable Annual Outputs by Alternative in the Salem District

	Baseline	Alternatives						PRMP
		NA	A	B	C	D	E	
Timber harvest (MMCF)	39.9	37.2	51.9	43.9	17.1	17.3	20.1	5.7
Non-resident recreational use ¹								
Fishing (angler days)	7,200	6,770	6,770	6,770	6,770	6,770	6,770	6,770
Hunting (hunter days)	2,700	2,170	2,170	2,170	2,170	2,170	2,170	2,170
Nonconsumptive (user days)	122,500	118,985	90,020	103,790	118,280	122,540	122,540	122,540
Forest Production Activity (\$MM)	N / A	2.595	3.768	3.426	1.236	1.395	1.798	1.116

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

MMCF = Million cubic feet

\$MM = Millions of dollars

N / A = Not Applicable

¹ See chapter 4, Effects on Recreation.

other wood-producing countries of the global economy (Perez-Garcia 1991). Increased use of substitute or recycled materials, including plastics, aluminum, steel, and cement, would result in reduced demand for wood products and are expected to gain wider use, particularly in residential construction.

Use of substitute building materials and alternative timber resources has raised concerns about their environmental impacts. Questions have also been raised about the incremental impacts of local, regional, and national environmental policy choices on the global economy and environment (Lippke 1991, Schallau and Goetzl 1992).

Issues of concern that have been studied include the increased use of fossil fuels, CO₂ emissions, environmental impacts of increased mining and quarrying, and supply of wood products from less productive or less efficient producers. Use of these and other materials, instead of wood products, for similar uses in residential construction required more energy (as measured in oil equivalent British Thermal Units) to produce and deliver (Koch 1991).

The rates at which reduced demand, substitute materials, and alternative supply sources would affect the wood products market are unknown. However, each replacement source can be expected to have associated economic and environmental impacts, often in other regions of the United States and the world.

Forest Production Activities

The structure of the forestry services sector would likely change under the direction established in the SEIS record of decision as management emphasis shifts from timber production to ecosystem management. As fewer acres are subject to harvest, there would be a decrease in post-harvest reforestation, stand maintenance, and protection needs. Workers in these forest production activities, who are predominantly Hispanic, would likely have many of the skills needed to conduct the additional forest treatment, inventory, monitoring and restoration activities envisioned in the forest management field described in the SEIS. It has been estimated that an additional 6,000 forestry services workers would be employed as a result of the SEIS within the range of the northern spotted owl (U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994). Many of these forestry services jobs, however, are low paying and cannot replace the wages associated with higher paying jobs associated with logging and millwork (Richardson 1993).

Recreation

Each alternative in the proposed resource management plan identifies management actions that would favor certain types of recreation or constrain development of recreation sites and facilities. Under alternatives A and B, BLM-administered lands would be unable to meet demand for nonmotorized travel,

camping, other land-based uses, boating, and other water-based uses (see discussion of recreation demand in Effects on Recreation section in this chapter). Alternatives no action and C would not meet demand for nonmotorized travel opportunities. These unmet demands would be primarily due to constraints which would be placed on development of trails, picnic areas, and campsites on BLM-administered lands. These constraints would change the amount of recreation-dependent personal income and employment attributable to BLM-administered lands in the district. However, substitution of recreation opportunities associated with other ownerships and areas within the Pacific Northwest is expected to satisfy all demand for recreation activities.

Special Forest Products

Assuming sustainable resource production can be maintained, demand for most special forest products is likely to be met under alternatives no action, A, and B. Lower fuelwood sales would occur under alternatives C, D, E, and the proposed resource management plan, resulting in lower federal permit receipts. Also, some individuals would be forced to purchase fuelwood from other sources at significant additional expense. Demand for other special forest products may or may not be met under the latter alternatives, depending upon management objectives for other resources and sustainability of resource production.

American Indians and nonnative settlers have collected forest products for personal use for many years. Commercial collection has expanded as more products are marketed. The competition between local collectors and collectors from outside the region can sometimes generate conflict (Richardson 1993). Recent Asian and Hispanic immigrants have been identified as specific cultural groups entering the region specifically to collect special forest products. Anecdotal evidence suggests that unemployed wood products workers are also participating in commercial collection.

Permitted collection of special forest products would be encouraged under all alternatives and may enhance local economies.

Personal Income and Employment

The BLMPACT model (U.S. Department of the Interior, BLM, OSO 1989b and 1989c) was used to analyze the employment and income associated with timber harvest, recreation, and forest production activities under each alternative for the Salem District and for western Oregon. Display of this information was changed from the draft resource management plan in response to public comments. The information is now displayed by economic sector. Employment and personal income associated with each resource commodity or activity are not shown. Nonmarket natural resource values were not included in the personal income and employment analyses.

Under all alternatives, reaching full plan-implementation would take several years of increasing activities. This could prevent fully reaching the estimated employment and income levels for several years. The employment and income estimates for the proposed resource management plan do not include the effect of restoration activities or the processing of wood removed from reserves as part of density management. In the district, 0.7 million cubic feet of timber per year might be removed from various reserves, providing additional wood supply income and employment.

Table 4-28 displays for the Salem District the varying levels of income and employment by sector associated with each alternative.

Under alternatives A and B, total personal income would exceed income in the baseline period. Personal income calculated for the other alternatives would fall below the baseline. Employment would exceed the baseline under alternatives no action, A, and B and fall below the baseline under the other alternatives.

An analysis was conducted to examine the effect of BLM management in all western Oregon districts on the western Oregon region. The common alternatives and the proposed resource management plans from all six BLM districts in western Oregon were combined. The BLMPACT model was then used to estimate dependent personal income and employment. The analysis methodology paralleled that of the individual districts. As a result of the economic interactions within the larger analysis area, the individual district results do not sum to the values calculated for western Oregon. Some areas have greater natural resource dependence with more direct

Table 4-28 Estimated Dependent Personal Income and Employment by Alternative, Salem District BLM

Personal income, millions (1989 dollars)	1984-1988		Alternatives															
			NA		A		B		C		D		E		PRMP			
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Total	21.473	49.318	20.854	47.842	28.659	65.970	45.192	56.310	10.037	22.863	10.175	23.169	11.793	26.904	4.106	9.135		
Farm	0.001	0.035	0.001	0.042	0.001	0.055	0.001	0.049	0.001	0.023	0.001	0.024	0.001	0.027	0.001	0.014		
Nonfarm	21.471	48.976	20.853	47.492	28.658	65.494	45.190	55.899	10.036	22.689	10.174	22.992	11.791	26.699	4.105	9.053		
Agricul. services, forestry, fishing, and other	0.001	1.070	0.819	1.825	1.189	2.590	1.081	2.268	0.390	0.857	0.441	0.911	0.568	1.116	0.353	0.514		
Mining	0.000	0.003	0.000	0.003	0.000	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001		
Construction	0.000	0.673	0.000	0.640	0.000	0.885	0.000	0.753	0.000	0.303	0.000	0.306	0.000	0.356	0.000	0.114		
Manufacturing	20.696	34.080	19.287	31.852	26.891	44.375	43.451	37.573	8.903	14.736	8.966	14.848	10.456	17.311	2.984	5.007		
Nondurable goods	0.036	0.898	0.034	0.908	0.027	1.209	0.272	1.051	0.034	0.472	0.035	0.482	0.035	0.550	0.035	0.245		
Paper and allied products	0.000	0.107	0.000	0.109	0.000	0.147	0.000	0.128	0.000	0.055	0.000	0.057	0.000	0.065	0.000	0.027		
Durable goods	20.660	33.182	19.253	30.944	26.864	43.167	22.725	36.521	8.868	14.264	8.930	14.366	10.421	16.761	2.949	4.762		
Lumber and wood prod.	20.660	32.530	19.253	30.316	26.864	42.300	22.725	35.783	8.868	13.965	8.930	14.063	10.421	16.410	2.949	4.646		
Transp. and public utilities	0.076	2.367	0.073	2.301	0.057	3.141	0.064	2.705	0.072	1.159	0.075	1.177	0.075	1.353	0.075	0.530		
Wholesale trade	0.016	0.138	0.016	0.135	0.012	0.173	0.014	0.153	0.015	0.076	0.016	0.078	0.016	0.087	0.016	0.045		
Retail trade	0.211	1.744	0.203	1.757	0.158	2.289	0.179	2.009	0.201	0.958	0.208	0.978	0.208	1.103	0.208	0.543		
Finance, insurance and real estate	0.000	2.118	0.000	2.134	0.000	2.924	0.000	2.511	0.000	1.039	0.000	1.058	0.000	1.228	0.000	0.458		
Services	0.472	6.783	0.456	6.845	0.351	9.112	0.401	7.924	0.453	3.561	0.469	3.635	0.469	4.145	0.469	1.842		
Government	0.000	0.308	0.000	0.308	0.000	0.421	0.000	0.362	0.000	0.151	0.000	0.154	0.000	0.178	0.000	0.067		
Federal, civilian	0.000	0.223	0.000	0.224	0.000	0.305	0.000	0.263	0.000	0.110	0.000	0.112	0.000	0.130	0.000	0.050		
State and local	0.000	0.085	0.000	0.084	0.000	0.116	0.000	0.099	0.000	0.041	0.000	0.042	0.000	0.048	0.000	0.018		
Employment (jobs)																		
Total	1,003	2,330	1,051	2,358	1,431	3,233	1,237	2,776	522	1,148	535	1,169	620	1,358	252	508		
Farm	0	8	0	9	0	12	0	11	0	5	0	5	0	6	0	3		
Nonfarm	1,002	2,308	1,051	2,334	1,431	3,200	1,236	2,748	522	1,136	534	1,157	619	1,343	252	502		
Agricul. services, forestry, fishing, and other	0	139	115	245	166	348	151	306	55	115	62	123	79	151	49	70		
Mining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Construction	0	26	0	25	0	34	0	29	0	12	0	12	0	14	0	4		
Manufacturing	934	1,303	870	1,219	1,214	1,998	1,027	1,438	402	565	405	569	472	663	135	193		
Nondurable goods	2	41	2	42	1	56	2	49	2	22	2	22	2	26	2	12		
Paper and allied products	0	5	0	5	0	6	0	5	0	2	0	2	0	3	0	1		
Durable goods	932	1,262	869	1,177	1,212	1,642	1,025	1,390	400	543	403	547	470	638	133	181		
Lumber and wood prod.	932	1,230	869	1,147	1,212	1,600	1,025	1,353	400	528	403	532	470	621	133	176		
Transp. and public utilities	3	87	3	85	2	115	2	99	3	42	3	43	3	50	3	19		
Wholesale trade	1	28	1	27	1	37	1	32	1	13	1	14	1	16	1	6		
Retail trade	16	134	16	135	12	175	14	154	16	73	16	75	16	85	16	42		
Finance, insurance and real estate	0	115	0	116	0	159	0	136	0	56	0	58	0	67	0	25		
Services	49	477	47	483	36	634	41	555	47	259	48	264	48	299	48	143		
Government	0	15	0	15	0	20	0	17	0	7	0	7	0	9	0	3		
Federal, civilian	0	8	0	8	0	11	0	10	0	4	0	4	0	5	0	2		
State and local	0	7	0	7	0	9	0	8	0	3	0	3	0	4	0	1		

Source: Calculations by the BLM Oregon State Office economist using BLMPACT.

effects, while other areas have greater economic diversity resulting in more indirect effects. Table 4-29 displays the results of the western Oregon cumulative analysis for the BLM alternatives.

The economic effects of the alternatives in western Oregon parallel those in the Salem District. Income and employment under alternatives no action, A, and B would exceed the baseline and fall below the baseline under the other alternatives.

The management of BLM's timber resource is only one component of a larger economy. The SEIS examined the cumulative effects on timber industry employment of ten alternatives. SEIS alternative 9, which was the basis for the SEIS record of decision, is the focus of the following discussion.

The SEIS analysis of cumulative effects was conducted using regional coefficients representing timber industry employment affected per million board feet of timber harvest. Timber industry employment was defined as Solid Wood Products plus Pulp and Paper. Self-employment, wage, and salary employment was included.

Within Oregon, subregional differences were identified. Employment in Solid Wood Products was similar for all regions except the central region (Deschutes, Klamath, Lake, Jefferson, and Wasco counties). In the central region, approximately 16 jobs per million board feet are affected. For the remaining subregions, approximately nine jobs per million board feet are affected. The Pacific Northwest region (Clackamas, Clatsop, Columbia, Hood River, Marlon, Multnomah, Polk, Tillamook, Washington, and Yamhill counties) was identified as having significant Pulp and Paper employment, 2.19 jobs per million board feet. The remaining subregions have limited Pulp and Paper employment per million board feet.

Overall, timber industry employment in western Oregon is projected to decline 23 percent from 1990 levels under the SEIS record of decision. A 40 percent reduction from the 1990 timber industry employment level is projected for the southwest subregion. A decline of 28 percent is projected for the west-central subregion (Benton, Lane, Lincoln, and Linn counties). The northwest and central regions are projected to experience less than 10 percent reductions in timber industry employment from the 1990 level.

County Revenues

Future prices for timber stumpage in the Pacific Northwest are a key determinant of future revenue effects. Oregon and California lands payments to counties, severance taxes, and federal treasury receipts are all affected by the level of BLM timber harvest, with the price of timber determined by a competitive bid process. Pacific Northwest timber prices are expected to increase from the baseline period as supplies from federal lands decrease.

Table 4-30 displays the projected prices and harvest levels by alternative together with the estimated Oregon and California lands payments to each county.

Prices under all alternatives are projected to increase significantly from the baseline period due to external factors beyond the scope of BLM's management alternatives (such as reduced harvest on national forest lands within the spotted owl region). The analysis assumes all BLM districts would adopt the same alternative. Under alternatives A and B, which increase harvest levels relative to those of the baseline period, county Oregon and California lands revenues would increase significantly over those of the baseline period. This is partly because external factors would cause timber prices to be higher than those of the baseline period. Under alternatives C, D, E, and the proposed resource management plan, increased stumpage prices would not fully mitigate timber harvest reductions, thus reducing Oregon and California lands payments to counties below those during the baseline period. In recent years, legislation has provided for additional safety net payments to the counties. As an example, in fiscal year 1991, payment of 96 million dollars was guaranteed. This was 152 percent of the average payment during the baseline period. Current legislation specifies a gradual decrease in the guaranteed payment level from the 1986-1990 average payment. These safety net payments have mitigated a large portion of county revenue impacts of reduced BLM harvest under the recent court injunctions. Table 4-30 does not incorporate this legislation into the estimates displayed, as it is subject to congressional revision.

Payments in lieu of taxes, made for a variety of federal lands within each county, are projected to remain unchanged under all alternatives. Potential changes in land tenure by the BLM and other federal agencies could alter the payments made to counties. County revenue impacts of specific exchanges or disposals are evaluated as they are proposed and are not included in this document.

Table 4-29 Estimated Dependent Personal Income and Employment by Alternative, Western Oregon BLM

Personal Income, millions (1989 dollars)	1984-1988		Alternatives													
			NA		A		B		C		D		E		PRMP	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Total	111.057	254.892	112.261	257.286	145.002	333.352	131.645	302.220	47.819	107.514	51.501	115.954	39.842	88.756	29.974	65.915
Farm	0.088	0.284	0.088	0.356	0.105	0.436	0.091	0.394	0.084	0.249	0.079	0.241	0.069	0.200	0.088	0.214
Nonfarm	110.969	252.980	112.173	255.202	144.896	330.702	131.555	299.811	47.735	106.471	51.422	114.874	39.773	87.901	29.887	65.179
Agricul. services, forestry, fishing, and other	0.010	5.191	6.538	11.515	8.230	14.767	7.410	13.306	4.665	6.509	3.935	5.976	2.316	3.825	2.814	3.824
Mining	0.000	0.017	0.000	0.017	0.000	0.022	0.000	0.020	0.000	0.007	0.000	0.008	0.000	0.006	0.000	0.005
Construction	0.000	3.575	0.000	3.499	0.000	4.555	0.000	4.123	0.000	1.395	0.000	1.525	0.000	1.162	0.000	0.830
Manufacturing	104.873	173.346	99.001	164.433	130.380	216.310	117.517	195.043	35.538	59.720	39.734	66.569	29.295	49.217	18.936	32.207
Nonurable goods	0.294	4.861	0.325	5.259	0.309	6.563	0.323	6.041	0.365	2.785	0.375	2.912	0.392	2.425	0.392	2.073
Paper and allied products	0.000	0.566	0.000	0.620	0.000	0.783	0.000	0.717	0.000	0.311	0.000	0.325	0.000	0.262	0.000	0.220
Durable goods	104.579	168.465	98.675	159.173	130.072	209.746	117.193	189.003	35.174	56.935	39.359	63.658	28.903	46.792	18.544	30.134
Lumber and wood prod.	104.579	165.154	98.675	155.855	130.072	205.439	117.193	185.100	35.174	55.574	39.359	62.182	28.903	45.664	18.544	29.309
Transp. and public utilities	0.622	12.587	0.681	12.871	0.646	16.408	0.679	15.058	0.770	6.126	0.792	6.522	0.832	5.271	0.830	4.233
Wholesale trade	0.127	0.771	0.139	0.807	0.132	0.977	0.139	0.913	0.157	0.483	0.162	0.507	0.170	0.453	0.170	0.401
Retail trade	1.665	9.742	1.819	10.544	1.726	12.926	1.816	11.989	2.057	6.046	2.116	6.310	2.224	5.458	2.218	4.791
Finance, insurance and real estate	0.000	11.073	0.000	11.843	0.000	15.202	0.000	13.822	0.000	5.398	0.000	5.690	0.000	4.403	0.000	3.496
Services	3.672	36.678	3.996	39.573	3.783	49.458	3.994	45.518	4.548	20.786	4.683	21.766	4.936	18.107	4.919	15.392
Government	0.000	1.628	0.000	1.729	0.000	2.214	0.000	2.015	0.000	0.794	0.000	0.839	0.000	0.656	0.000	0.522
Federal, civilian	0.000	1.183	0.000	1.259	0.000	1.610	0.000	1.466	0.000	0.583	0.000	0.616	0.000	0.483	0.000	0.387
State and local	0.000	0.445	0.000	0.470	0.000	0.604	0.000	0.549	0.000	0.211	0.000	0.223	0.000	0.172	0.000	0.135
Employment (jobs)																
Total	5,299	12,204	6,107	13,236	7,760	16,982	7,080	15,442	3,031	6,078	3,126	6,382	2,437	4,920	2,048	3,930
Farm	15	58	15	72	17	89	15	81	14	50	13	48	12	40	15	42
Nonfarm	5,285	12,068	6,093	13,081	7,742	16,788	7,065	15,265	3,017	5,991	3,112	6,294	2,425	4,849	2,033	3,863
Agricultural services, forestry, fishing, and other	0	756	1,024	1,751	1,289	2,245	1,161	2,022	730	998	616	913	362	580	440	586
Mining	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Construction	0	132	0	130	0	169	0	153	0	52	0	56	0	43	0	31
Manufacturing	4,734	6,574	4,469	6,247	5,885	8,213	5,204	7,407	1,605	2,280	1,795	2,539	1,324	1,880	856	1,237
Nonurable goods	15	224	16	247	15	307	16	283	18	133	19	138	19	115	19	100
Paper and allied products	0	24	0	26	0	32	0	30	0	13	0	13	0	11	0	9
Durable goods	4,719	6,350	4,453	6,000	5,869	7,906	5,288	7,124	1,587	2,147	1,776	2,401	1,304	1,765	837	1,137
Lumber and wood products	4,719	6,186	4,453	5,838	5,869	7,695	5,288	6,934	1,587	2,082	1,776	2,329	1,304	1,711	837	1,098
Transportation and public utilities	23	463	26	477	24	606	25	554	29	225	30	240	31	194	31	155
Wholesale trade	5	145	6	146	5	188	6	171	6	64	6	69	7	54	7	42
Retail trade	132	753	144	815	137	997	144	926	163	469	168	490	176	425	176	373
Finance, insurance and real estate	0	501	0	646	0	828	0	753	0	296	0	312	0	242	0	193
Services	391	2,643	425	2,871	402	3,541	425	3,279	484	1,606	499	1,676	526	1,432	524	1,247
Government	0	78	0	83	0	106	0	97	0	38	0	40	0	31	0	25
Federal, civilian	0	44	0	47	0	60	0	54	0	22	0	23	0	18	0	14
State and local	0	34	0	36	0	47	0	43	0	16	0	17	0	13	0	10

Source: Calculations by the BLM Oregon State Office economist using BLMPACT.

Table 4-30 Projected O&C Payments to Counties Attributable to Timber Harvest in Western Oregon (millions of constant dollars)

County	1984-1988	Alternatives						
	Baseline	NA	A	B	C	D	E	PRMP
Benton	\$ 1.769	\$ 3.652	\$ 4.761	\$ 4.333	\$ 1.352	\$ 1.521	\$ 1.115	\$ 724
Clackamas	\$ 3.477	\$ 7.213	\$ 9.403	\$ 8.558	\$ 2.670	\$ 3.005	\$ 2.203	\$ 1,430
Columbia	\$ 1.301	\$ 2.677	\$ 3.490	\$ 3.176	\$ 991	\$ 1.115	\$ 818	\$ 531
Coos	\$ 4.147	\$ 7.668	\$ 9.996	\$ 9.097	\$ 2.838	\$ 3.195	\$ 2.342	\$ 1,520
Curry	\$ 2.290	\$ 4.743	\$ 6.184	\$ 5.628	\$ 1.756	\$ 1.976	\$ 1.449	\$ 941
Douglas	\$ 15.849	\$ 32.555	\$ 42.439	\$ 38.625	\$ 12.051	\$ 13.563	\$ 9.943	\$ 6,456
Jackson	\$ 9.827	\$ 20.364	\$ 26.548	\$ 24.162	\$ 7.538	\$ 8.485	\$ 6.220	\$ 4,038
Josephine	\$ 7.578	\$ 15.699	\$ 20.466	\$ 18.626	\$ 5.811	\$ 6.541	\$ 4.795	\$ 3,113
Klamath	\$ 1.464	\$ 3.041	\$ 3.964	\$ 3.608	\$ 1.126	\$ 1.267	\$ 929	\$ 603
Lane	\$ 9.627	\$ 19.845	\$ 25.870	\$ 23.545	\$ 7.346	\$ 8.268	\$ 6.061	\$ 3,935
Lincoln	\$ 233	\$ 468	\$ 610	\$ 555	\$ 173	\$ 195	\$ 143	\$ 93
Linn	\$ 1.669	\$ 3.431	\$ 4.473	\$ 4.071	\$ 1.270	\$ 1.429	\$ 1.048	\$ 680
Marion	\$ 918	\$ 1,897	\$ 2,474	\$ 2,251	\$ 702	\$ 791	\$ 580	\$ 376
Multnomah	\$ 684	\$ 1,417	\$ 1,847	\$ 1,681	\$ 524	\$ 590	\$ 433	\$ 281
Polk	\$ 1.359	\$ 2.807	\$ 3.659	\$ 3.331	\$ 1.039	\$ 1.170	\$ 857	\$ 557
Tillamook	\$ 355	\$ 728	\$ 949	\$ 863	\$ 269	\$ 303	\$ 222	\$ 144
Washington	\$ 397	\$ 819	\$ 1,067	\$ 971	\$ 303	\$ 341	\$ 250	\$ 162
Yamhill	\$ 460	\$ 936	\$ 1,220	\$ 1,110	\$ 346	\$ 390	\$ 286	\$ 186
Total	\$ 63.414	\$ 129.958	\$ 169.418	\$ 154.190	\$ 48.107	\$ 54.145	\$ 39.693	\$ 25.771
Assumed Price ¹	\$ 707	\$ 1,608	\$ 1,576	\$ 1,589	\$ 1,674	\$ 1,667	\$ 1,680	\$ 1,692
Total Volume (MMCF)		191	251	227	68	76	56	36
O&C Volume (MMCF)		162	215	194	57	65	47	30

NA = No Action Alternative

PRMP = Proposed Resource Management Plan

MMCF = Million cubic feet

¹ Prices estimated based on an index of 1982 constant dollars scaled to the 1984-1988 actual average price of \$ 707.34 (U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon 1992; revised 1994).

Approximately five percent of the revenues generated by public domain lands are dispersed throughout the state to counties proportionate to the land area within the county. Historically, timber harvest has been the dominant source of revenue from these lands. Based on estimated proposed sale quantities, revenues of alternatives no action, A, and B would increase. Under the other alternatives, revenues would be reduced. The counties use these revenues to build roads, bridges, and other capital improvements. Funding for these projects would be reduced by alternatives C, D, E, and the proposed resource management plan. Opportunities exist in the future to increase revenue collections for use of public domain lands. For example, collections associated with special forest products permits and special recreation permits could increase if these programs expand.

Under alternatives no action, C, D, E, and the proposed resource management plan, harvest volumes subject to the state Forest Products Harvest Tax would decline from baseline levels. Given constant tax rates, revenues could be expected to decline under these alternatives. Decreases in revenues would negatively impact programs funded by this tax, such as forest research and fire prevention or suppression. The Oregon State Legislature sets the tax rate and in recent bienniums has significantly increased the tax rate, as well as a number of programs funded by the tax. In future sessions, the legislature could increase the tax rate to maintain constant revenue streams despite decreased harvest volumes.

After examining the impacts of reduced timber harvest on both BLM and Forest Service lands, the SEIS concluded that anticipated timber price increases would not fully offset the revenue declines to the federal and local governments from implementation of the SEIS alternatives. Like the analysis displayed in table 4-30, the historical distribution formula of Oregon and California lands payments was used. The current congressional safety net was not included.

Several state and county issues would make it difficult for counties to replace federal timber revenues. Among the issues are passage of Ballot Measure 5 Property Tax Limitation and a general anti-tax sentiment among voters as demonstrated by the defeat of several sales tax initiatives. Interviewed individuals and county officials in rural counties expressed concern about this decreasing tax base (Richardson 1993).

Community Structure and Attributes

Recent discussions of community stability by natural resource sociologists have identified three broad definitions of human communities - a geographic area, local social systems, and types of relationships. Examples of these communities include town, county, or state boundaries, commuting area, or relationships such as occupation or religious affiliation.

Community stability is an often stated desire of residents in all types of communities. Stability is a misnomer, however, since communities are in a constant state of transition, and the status quo is rarely maintained. Attributes of prosperity, adaptability, cohesiveness, and ability to absorb and cope with change have been identified as desirable by some definitions of community stability (Society of American Foresters 1989). These definitions recognize change and seek orderly change as a desired goal.

Many geographic, social, or relational factors affect the above-listed desired attributes of any community. These factors include economic diversity, economic stability, population stability, social cohesion or community solidarity, structural diversity, location, quality of life, human capital, size, and local leadership. In the Pacific Northwest, timber or forest dependence has been identified as a destabilizing factor due to recent changes in forest management (U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM 1994).

The Forest Ecosystem Management Assessment Team report (1993) and the SEIS identify attributes of communities likely to experience economic and social impacts which would disrupt existing community structures and trends. Communities with these attributes were labeled "most at risk". Specifically, the SEIS text (page 2-82) states:

The "most at risk" communities differ from others in significant ways. These communities are smaller (average population 3,000), and they are located in counties with low population density. Isolated communities are more likely to experience negative consequences...because they have fewer employment options available locally or in nearby communities, and because of limited access to capital, transportation links, and other resources. Communities that are small, isolated, and lacking in economic diversity are more likely to be "at risk" than others. These communities may find it difficult to mobilize and respond to changing conditions that may affect a variety of

groups. These communities are likely to experience unemployment, increased poverty, and social disruption in the absence of assistance.

A study of the socioeconomic effects of BLM's proposed resource management plans in western Oregon was conducted by the Institute for Resources in Society, University of Washington (Richardson 1993). A major part of the study was to determine who is affected by agency actions and how they are affected. Richardson obtained information through interviews with BLM employees and several people in each district who were familiar with the BLM and the area. These individuals were selected by district employees and often had worked with the BLM citizen advisory council in the district. They included local bank officers, tribal representatives, city, county and state officials, social service and development administrators, timber interests, and environmental professionals.

The following discussion of the socioeconomic effects of BLM management within the district includes information from a variety of sources but relies heavily on the research done by Richardson. A copy of the full report prepared by Richardson is available for review in the district office.

The questions "Who is affected by BLM resource management in the Salem District and how are they affected?" are simple. However, a complete answer must consider many interacting social and economic processes, and, fundamentally, peoples' relationships with self, one another, the BLM and other institutions, and the environment. People who are affected by BLM management in the district include:

- people who directly use the lands;
- people who use natural resources that are affected by management of the lands (e.g., timber, fish, and water); and
- people who care about management of the lands.

Given global trade in forest products and national and international interest in northwest forest management in recent years, people across the nation and the globe are affected by BLM management.

In general, local residents receive the greatest quantity of tangible and intangible benefits from BLM lands. Thus, local residents are most likely to be strongly affected, positively and negatively, by changes in BLM resource management activities. The direction and intensity of the effects will vary with individuals' personal uses and values for the lands. People are affected in many aspects of their lives - as workers, as members of families and communities,

as consumers, and in their relationships with other people and the environment. The effects of BLM management on people occur in the context of existing socioeconomic processes. The BLM has little control over many of these processes, but these processes can both magnify and reduce the intensity of the BLM's socioeconomic effects.

Timber industry impacts are estimated to vary substantially by subregion and BLM district. The Salem District is included within the northwest subregion of the SEIS and also represents a portion of the west-central region. Both regions are identified as having the smallest displacement in timber industry employment and the greatest alternative employment possibilities (Phillips 1994). Persons interviewed by Richardson predicted that the strongest effects on timber industry unemployment would occur in Linn County. Areas of the Coast Range were also considered vulnerable to BLM harvest reductions. The effects cited included uncertainty for the future and perceptions of vilification of the timber industry in the media and society at large. The effects of this uncertainty have extended to communities and the timber industry, stifling investment and creative responses to current economic development and forest management challenges.

A person's work can provide both income and an important source of identity; thus the loss of employment can bring economic and psychological hardship to individuals, their families, and their communities. Unemployment in the Oregon timber and wood products industries in the 1980s and 1990s has had these effects. The timber harvest levels proposed in the proposed resource management plan will support lower levels of employment in the wood products industry than were supported by harvests in the 1980s.

The causes of job losses in the wood products industry over the past decade are multiple, and include recessions in the early 1980s and 1990s, changes in worker productivity, and court injunctions on timber sales from federal lands. Although workers in the industry have adapted to fluctuating employment caused by economic and business cycles, job losses caused by changing federal policies appear to be permanent, rather than temporary in nature. For people who do not believe that reductions in federal harvest levels are warranted, current and projected unemployment in the wood products industry is a source of great distress.

The interacting factors that are contributing to job losses in the wood products industry make it difficult to measure the specific effects of BLM management.

However, the high visibility of changes in federal forest management compared with these other factors lead many people to attribute unemployment in the wood products industry solely to BLM and Forest Service harvest levels.

Despite the common focus on timber in discussions of federal forests, the BLM contributes to employment and income in the district in many ways. Environmental quality is vital to many aspects of Oregon's economy (e.g., tourism, commercial fishing, and seafood processing, and the ability to attract new business and good workers). Retirees moving to Oregon also contribute to local economies. As the BLM contributes to improvements in environmental quality, it will be contributing to the growth of these economic sectors in the state and in local communities.

The BLM provides economically valuable infrastructure (e.g., roads, utility corridors and communication sites, and water supplies) for people throughout the district. Water quality is predicted to improve under the proposed resource management plans.

Special forest products are rapidly increasing in economic importance. But much information about the scale, environmental effects, and economic value of collections remains anecdotal. The probable effects of the proposed resource management plan on special forest products collectors is unclear, but BLM managers anticipate increasing regulation in coming year.

Many timber-producing areas in the district are actively seeking to diversify their economies, often focusing on tourism and retirement services. However, average wages in retail trade and services, which are the fastest growing economic sectors in the state, are much lower than wages in the timber industry. For Oregon, in 1990 the average annual wage in lumber and wood products manufacturing was \$25,104; in services, it was \$18,757; and in retail trade it was \$12,594.

Within the Salem District, BLM and Forest Service receipts are important to Benton, Columbia, Lincoln, Linn, Polk, and Tillamook counties (greater than 10 percent of county expenditures). The metropolitan counties of Multnomah, Washington, Clackamas, and Yamhill receive smaller portions of total revenues from federal forest receipts. Clatsop County has only 40 acres of federally-managed forestland and receives no federal forest receipts. Examinations of Columbia, Benton, Polk and Linn counties by Lee et al. (1991) determined that Oregon and California lands revenue reductions would impact county health

and law enforcement programs. County road maintenance is also expected to be impacted as designated funding from national forest revenues are reduced (Lee et al. 1991).

Revenues from BLM timber sales have historically provided most payments to counties, but Congress has provided safety net payments during the 1990s as court injunctions have restricted the sale of timber from BLM-administered lands. The effects of BLM management on county revenues will depend on if the federal government chooses to continue safety net payments.

If county revenues drop, the poor and unemployed will suffer most as services that they use are cut back or eliminated. All county residents may be affected to some extent if law enforcement and emergency services, parks and libraries, and maintenance of roads and other infrastructure are reduced. Meanwhile, communities anticipate increasing demand for many of the services that may be cut, due to unemployment in the timber industry.

Ballot Measure 5 and shrinking tax bases in some communities constrain local government's abilities to raise revenues from other sources. National forest payments to counties may also decline, depending on federal decisions. Ballot Measure 5 and declining national forest payments particularly affect education, and many people are concerned about the long-term social and economic effects of a poorly funded educational system. Combined with reductions in other local services and infrastructure, these changes could negatively affect communities' economic development efforts by making them less attractive to new businesses and retirees.

Unemployment has been linked with increases in drug and alcohol abuse, domestic violence, and stress-related physical and mental health problems, among other negative consequences. As wood products jobs have declined in many rural communities over the past 13+ years, many workers have left those communities, stretching or breaking ties with family and friends who remained. At the same time, many of these same rural areas have been experiencing influxes of retirees and other new migrants, who have brought new ideas and expectations for forest management with them.

Many traditionally timber-producing families and communities feel that their way of life and many of their basic values are threatened by changes that have been occurring, and by their perceptions of negative stereotypes of loggers and millworkers in the media. The proposed resource management plan

compounds these perceptions for many who are already greatly distressed by projecting increased unemployment.

For many rural and urban residents of the district, the proposed resource management plan is a step in the right direction, but does not go far enough to protect the environment and to remedy perceived environmental damage from past management practices. People who have moved to rural areas in search of a pleasant, healthful place to retire or raise a family are especially concerned about the environmental effects of BLM practices such as clearcutting, herbicide use, and prescribed burning.

People on all sides of resource management issues in the district care deeply about forests and the natural environment, but they can have differing ideas about how that care is best expressed. The proposed resource management plan would benefit people whose aesthetic, cultural, and spiritual values are fulfilled by environmental preservation and some forms of recreation. For people who also express personal values and find meaning through working the land, the proposed resource management plan would provide less recognition of this way of appreciating the natural environment. Thus, some people would gain and others would lose in the quality of their relationships with the natural world, as the proposed resource management plan provides more opportunities for preservation and recreation uses and fewer opportunities for timber management.

Effects on Rural Interface Areas

Resource management activities, such as road construction, timber harvest and minerals development, can create adverse impacts on neighbors living in rural interface areas (see chapter 3, Rural Interface Areas, for a list of known impacts related to BLM management in the Salem District). In turn, the reactions of neighbors to these activities can create extra costs for BLM to manage resources in rural interface areas. These include opportunity costs (e.g., decisions to defer or not harvest timber) and direct dollar costs (e.g., personnel time in redesigning projects and responding to protests and appeals). For analysis purposes, the number of expressed concerns and the additional costs to the BLM are assumed to be directly proportional to the number of neighbors and the number of possible BLM resource management activities in the rural interface areas. The rural interface area data base is not totally

sufficient for an analysis of this issue. For instance, it does not differentiate between rural interface area neighbors who might or might not be concerned about BLM management activities. Also, it does not account for neighbors outside mapped rural interface areas who might be concerned. However, the data base is sufficient for determining the relative differences in impacts between alternatives.

Alternative A estimates harvesting 3,300 acres of timber in the first decade within one-half mile of 1 to 20-acre zoned areas (see appendix EE). Also, roads would be built to access the timber. No special timber management actions or mitigation measures would be required in rural interface areas under this alternative. If mineral exploration and development occurs in the rural interface areas, it would be minimally restricted. The amount of expressed concerns due to this potential activity is expected to be high compared to the no action alternative.

First decade timber harvest estimated under alternative B would be approximately 3,000 acres within one-half mile of 1 to 20-acre zoned areas. Where feasible and consistent with sustained yield timber management, special timber harvest mitigation measures would be used within one-quarter mile of 1 to 5-acre zoned areas. Future oil and gas development within a one-quarter mile of these areas would be allowed but with controlled surface use. Expressed concerns under alternative A would approximate those expected under the no action alternative.

Alternative C estimates harvesting approximately 1,400 acres of timber in the first decade within one-half mile of 1 to 20-acre zoned areas. All timber would be selectively harvested, and other special timber harvest mitigation measures would be used if necessary. Future oil and gas development would be allowed but with controlled surface use. The amount of expressed concerns due to this potential activity and proposed mitigation is expected to be low compared to the no action alternative.

Under alternatives D and E, the potential for expressed concerns in all rural interface area categories would be low due to constraints on timber harvesting (no clearcutting, no burning, no herbicide spraying and wide riparian buffers) and minerals development (controlled surface use).

The no burning feature of alternatives D and E could increase fire hazard situations in rural interface areas. If logging slash is left in harvest units, a wildfire could quickly burn through the units and make it difficult to protect nearby homes and other improvements from

damage or destruction. Although mitigation measures are possible (e.g., mechanical removal or chipping of slash), the fire hazard would remain higher than normal due to the quick regrowth of understory vegetation.

Under the proposed resource management plan, approximately 480 acres of timber is estimated to be harvested within one-half mile of 1 to 20-acre zoned areas. In Late-Successional Reserves and Connectivity/Diversity Blocks, forests would be managed with practices designed to enhance and/or maintain late-successional conditions (see chapter 2 for a description of practices). Impacts in rural interface areas would be minimal. In the general forest management area, special timber harvest mitigation measures would be considered when operating within mapped rural interface areas and, if necessary, when operating near 40-acre plus zoned areas. Future oil and gas development in rural interface areas would be allowed but with controlled surface use. The amount of expressed concerns due to potential activities under the proposed resource management plan is expected to be low compared to the no action alternative.

The increased use of helicopter logging envisioned in alternatives C, E, and the proposed resource management plan would increase noise for those living in adjacent or nearby rural interface areas. These impacts would occur during daylight operating hours. The frequency could vary from a few as two to as many as 150 passes per day. Previous experience indicates that rural interface residents are most often affected in the early morning and late evening hours. In many cases, noise from a helicopter is audible most of the day with the greatest amount of noise occurring when a helicopter is within 500 feet of the listener. Possible helicopter logging restrictions could include hours of operation, location of landings, flight paths, etc. These restrictions would reduce, but not eliminate, helicopter noise. This would be an unavoidable adverse effect of implementing the proposed resource management plan.

Locatable mineral development, if it occurs in rural interface areas, could have long-term and unavoidable impacts.

Effects on Wildfire

The intensity and size of any wildfire depends largely on the local weather at the time of and following ignition, long-term and seasonal climatic patterns, amount and distribution of available fuel, the slope and aspect of the landscape on which the fire is burning, the availability of suppression forces, and the amount of time it takes to reach the wildfire and take suppression actions. Most of these factors remain constant under each of the alternatives, except for the type and level of fuels management. Suppression efficiency and effectiveness analysis is conducted at the activity planning level of management.

Due to the fragmented ownership pattern in most of the planning area, wildfire potential is not dependent on BLM land management activities alone. Historically, the majority of large stand replacement wildfires have involved multiple ownerships and either started in or were intensified by untreated logging and precommercial thinning slash fuel. Fire intensity and severity has also increased due to the exclusion of fires from fire dependent ecosystems. Salvage of dead and dying trees and stands could further reduce fuel hazard, but is not proposed for all land allocations under all alternatives.

Industrial operations and escaped prescribed fires have been the primary cause of wildfires throughout much of the planning area. The occurrence of human-caused wildfires has also increased due to recreation use, debris burning by private residences within the rural interface areas, and timber management activities on both private and public land. Certain activities proposed in the alternatives change the risk of large scale, high intensity wildfires. The primary factors that could increase the relative risk of wildfire are an increased amount of fuel produced through timber management and silvicultural stand treatments (e.g., thinning), the unnatural build up of fuels through fire suppression activities, as well as the natural successional changes in ecosystems. Unless fuels are actively managed, this increased risk will affect the objective of limiting the occurrence of large scale, high severity wildfires.

Prescribed burning and other types of fuels management that would reduce fuel buildups could decrease the relative risk of wildfire. Prescribed burning includes both traditional broadcast and pile burning as well as underburning prior to harvest. Underburning, brushland burning, burning of oak savannas, and

grassland burning are also proposed as a methods to reintroduce fire into these ecosystems. Each of these ecosystems had some natural fire regime prior to fire suppression and will change in species composition, structure and function without fire as a natural process. Underburning can be used to reduce fuel loading and vertical fuel continuity. Wildfires in stands that are managed using underburning are generally less severe, and fire suppression is aided thereby limiting the size of wildfires, while using methods that have a lower environmental impact and reducing the costs of wildfire suppression, particularly when underburning is implemented over large areas (U.S. Department of the Interior 1992).

Mosaics of stands and landscapes with varying forest ages, structures and densities and with areas of reduced fuels would allow safe access for fire suppression crews and provide strategic locations for efficient and effective fire suppression. Silvicultural treatments other than prescribed fire would be used in some stands reduce wildfire hazard. The specific effects of fuel reduction to mitigate wildfire risk cannot be fully assessed at this planning scale but should be considered in province-level, watershed and landscape-level analyses, as well as in site-specific planning.

Forest thinning, conifer release by cutting hardwoods, and thinning of the forest understory produce fuels that would remain a fire hazard until the material is reduced by natural decomposition (10 to 20 years), unless managed effectively. Thinning or brushing early in early successional stages can facilitate fuel hazard mitigation. Operationally, some timber harvest units planned for treatment with prescribed fire could not be completed due to timing objectives for reforestation. These untreated acres would directly contribute to fuel hazard.

Alternatives no action, A, and B have the greatest potential for increasing wildfire risk because of the large amounts of untreated logging slash, precommercial thinning slash, and hardwood slash that would be produced. Alternatives C, D and the proposed resource management plan would produce moderate amounts of untreated logging slash.

Underburning proposed in the alternatives would also reduce the risk of wildfire. Alternatives C, D, E, and the proposed resource management plan have the highest likelihoods of reducing the risk of wildfire through underburning. Under alternatives no action, A and B, no underburning is proposed and this would increase the risk of wildfire.

The prohibition of burning within the rural interface areas in alternatives D and E would increase the potential risk of wildfire in these areas from untreated fuels. This risk can sometimes be decreased by the use of alternative fuel treatments.

Conclusion

Alternatives A and B would increase the potential risk of wildfire over the no action alternative due to the increase in the amount of untreated slash and lack of planned underburning. Alternatives C, D, E, and the proposed resource management plan would reduce the risk of wildfire compared to the no action alternative by increased fuels management including the use of underburning. The costs of prevention, detection, and initial attack, and actual fire suppression costs would vary by alternative. These costs cannot be determined at this time, because they are more dependent upon costs incurred from wildfires rather than from the potential of wildfire.

While management activities that reduce fuel hazards would help reduce potential wildfire risk, the potential for wildfire on all lands in the planning area under all alternatives would be expected to remain high for the short term. This is due to the continued increase in fuel hazard from timber management activities, conifer mortality associated with drought, and unnatural accumulations of fuels within established stands due to historical suppression of wildfire in some fire dependent or fire adapted plant communities. A total fire protection strategy is likely to be unsuccessful in providing protection against catastrophic disturbance in the planning over the next 50 to 100 years, while fire severity will become skewed toward higher severity levels. The risk of large, high severity wildfires, as well as potential mitigation of that risk, is best evaluated at the watershed level and was not assessed in this resource management plan.

Consistency with Other Agency Plans and Programs

BLM planning regulations require that resource management plans be "...consistent with officially approved or adopted resource-related plans and the policies and procedures contained therein, of other federal agencies, state and local governments, and Indian tribes, so long as the guidance and resource management plans are also consistent with the purposes, policies and programs of federal laws and regulations applicable to public lands..." (43 Code of Federal Regulations 1610.3-2). Consistency is construed as the absence of conflict. Based on BLM's knowledge of the plans of such other agencies, the proposed resource management plan has been compared to the following agencies' plans, for consistency, and BLM has reached the conclusions stated.

Federal Agencies

The proposed resource management plan is believed to be consistent with the following plans of other federal agencies:

- The Record of Decision on the 1994 Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.
- The Forest Service's forest-wide land use plans for the adjacent Mt. Hood, Willamette, and Siuslaw national forest(s).
- Soil Conservation Service watershed plans.
- The Coastal Barrier Improvement Act of 1990 and draft (proposed) Pacific Coastal Barriers Study for areas under consideration for inclusion in the Coastal Barriers Resource System, as administered by the U.S. Fish and Wildlife Service.
- The Endangered Species Act and the following U.S. Fish and Wildlife Service plans (see Effects on Special Status Species).
 - Pacific Bald Eagle Recovery Plan.
 - Final Draft Northern Spotted Owl Recovery Plan.
 - Fish and Wildlife Service determination of critical habitat for the northern spotted owl.
- The National Park Service's Nationwide Rivers Inventory (see Effects on Wild and Scenic Rivers).

- The Bonneville Power Administration's latest annual Transmission System Facilities Resource Program.
- The Northwest Power Planning Council, Columbia River Basin, Fish and Wildlife Program and subordinate species-specific strategies.
- Army Corps of Engineers' plans for management of recreation use on and around Green Peter Reservoir.

State Government

The proposed resource management plan is believed to be consistent with the following plans, programs, and policies of state of Oregon agencies:

- Department of Environmental Quality (see Effects on Air Quality).
 - Visibility Protection Plan and air quality policies.
 - Prevention of Significant Deterioration requirements.
- Department of Forestry
 - Smoke Management Plan.
- Water Resources Department river basin programs for the Willamette River and Sandy River basins.
- Water Resources Commission rules and statutes.
- Department of Human Resources, Health Division, standards for public water systems.
- Department of Agriculture
 - Weed control plans.
 - State-listed endangered plant species (see Effects on Special Status Species).
- Division of State Lands
 - Removal-Fill Law.
 - Natural Heritage Program.
- Parks and Recreation Department
 - Statewide Comprehensive Outdoor Recreation Plan (see Effects on Recreation).
 - State Parks and Recreation System Plan.
 - State Recreation Trails Plan (see Effects on Recreation).
 - State Historic Preservation Program.
 - Oregon Beach Law.
 - State Scenic Waterways Program and related projects.
- Department of Transportation, Highway Division
 - Oregon Highway Plan.
 - Six-Year Highway Improvement Plan.

- Economic Development Department, Regional Economic Development Strategies.

Consistency of the alternatives with some other state plans and programs is more complex, as described in the following discussions.

Consistency with the Department of Environmental Quality's Statewide Water Quality Management Plan (including Water Quality Standards and Guidelines) and the state's antidegradation policy would vary by watershed analyzed. The cumulative effects of timber harvest activities on BLM-administered lands plus other ownerships could lead to violation of the state's antidegradation policy in one or more of the watersheds analyzed unless either private activities are less than anticipated (by BLM) or BLM can lessen the cumulative impacts by scheduling its timber sales to occur at different periods than most of the anticipated private timber harvest.

Consistency with the Department of Fish and Wildlife's many plans, policies, rules and objectives is addressed in appendix FF.

Consistency with the Board of Forestry's Forestry Program for Oregon is complex, due to the diversity of goals of the Forestry Plan for Oregon. Specificity regarding consistency with the five Forestry Plan for Oregon objectives is provided in appendix GG.

The proposed resource management plan would be consistent with the *Oregon Benchmarks* (Oregon Progress Board 1992) for water, forest land, wetlands, fish and wildlife, and outdoor recreation. It would not, however, be likely to support reaching the 1995 and 2000 benchmarks for increasing standard of living, affordable housing, family stability, and stable home life.

Consistency with the statewide planning goals and guidelines administered by the Land Conservation and Development Commission through the Department of Land Conservation and Development is variable among the 16 goals for which district BLM plan consistency is relevant. Oregon's land use program was enacted 21 years ago. Today a complex body of land use policy and goal interpretations exists due to the acknowledgment process, goal amendments, Land Conservation and Development Commission rule making, and Land Use Board of Appeals and appellate court decisions. The matter of BLM consistency with the statewide goals involves a number of interrelated issues of policy, intergovernmental coordination and state and federal legal

requirements. Consistency with these goals is characterized generally in appendix HH. That discussion also addresses consistency of BLM's proposed resource management plan with the goals established for the Oregon Coastal Management Program.

The statewide planning goals are legally binding on all planning activity relating to land use undertaken by cities, counties, special districts, and state agencies. The planning goals function similarly for affected federal agencies making consistency determinations under the Oregon Coastal Management Program in accordance with the federal Coastal Zone Management Act. All applicable local government plans have been acknowledged by Land Conservation and Development Commission to be in conformance with the Coastal Zone Management Act and all state agency programs and activities have been certified by Land Conservation and Development Commission to be in conformance with the Coastal Zone Management Act. Local governments will, over the next few years, be revising their plans to comply with recent administrative rule revisions related to goals 4 and 12 in the former instance increasing protection of forest lands and resources from conflicting uses and inappropriate rural development.

A section of the Coastal Zone Management Act requires that "Each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs" (subsection 308(c)(1)). The term "to the maximum extent practicable" means that federal agency's activities must be consistent with mandatory, enforceable, federally approved state coastal zone policies whenever the agency has discretion under federal law to abide by state policies. The Coastal Zone Management Act does not, however, impose a higher duty on federal agencies than a state requires of its own agencies. The Oregon Coastal Management Program mandatory enforceable policies consist of the statewide planning goals, acknowledged city and county comprehensive plans and land use regulations, and the statutory authorities and regulations of state agencies listed in the Oregon Coastal Management Program. Although federal lands are excluded from the boundaries of the coastal zone, the "directly affecting" provision requires federal agencies to examine their activities for offsite effects. An effect may be either a primary, secondary, or cumulative effect on the coastal zone.

Local Government

The Oregon statewide planning program attached substantial importance to the coordination of federal plans with acknowledged local comprehensive plans. To the extent that BLM actions and programs are consistent with acknowledged county and city comprehensive plans and land use regulations, they can also be considered consistent with statewide planning goals. Local plans do not, however, address protection of goal 5 values from the effects of forest management, as state law prohibits local governments from regulating forest practices. The comprehensive plans for Benton, Clackamas, Columbia, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington, and Yamhill counties could be affected by the Salem District proposed resource management plan.

The district has contributed data for development of county comprehensive plans, followed the development of those plans through the years and consulted on issues of mutual interest. Based on knowledge gained through this involvement, the district planning staff believes that the proposed resource management plan is consistent with the comprehensive plans and land use regulations cited above.

Tribal Plans

The Confederated Tribes of Siletz Indians and the Confederated Tribes of Grand Ronde Indians control lands within the planning area. The tribes have no known plans that establish expectations related to possible resource management plan decisions by BLM.

Chapter 5

Consultation and Coordination

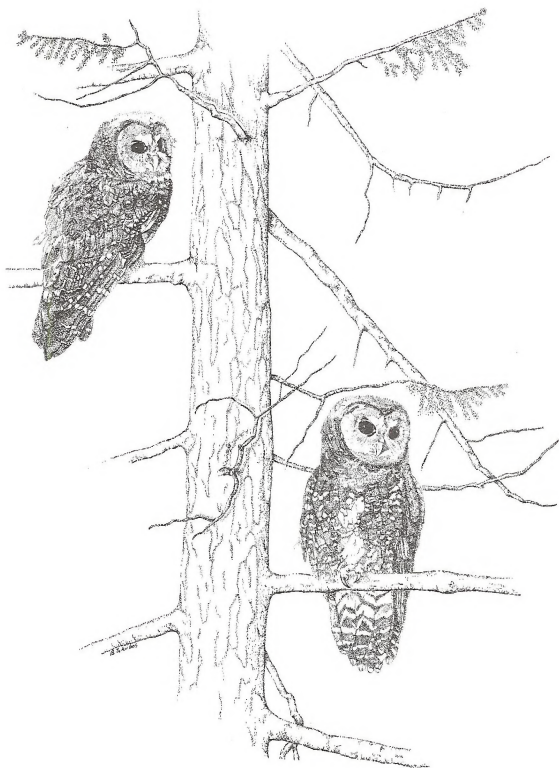


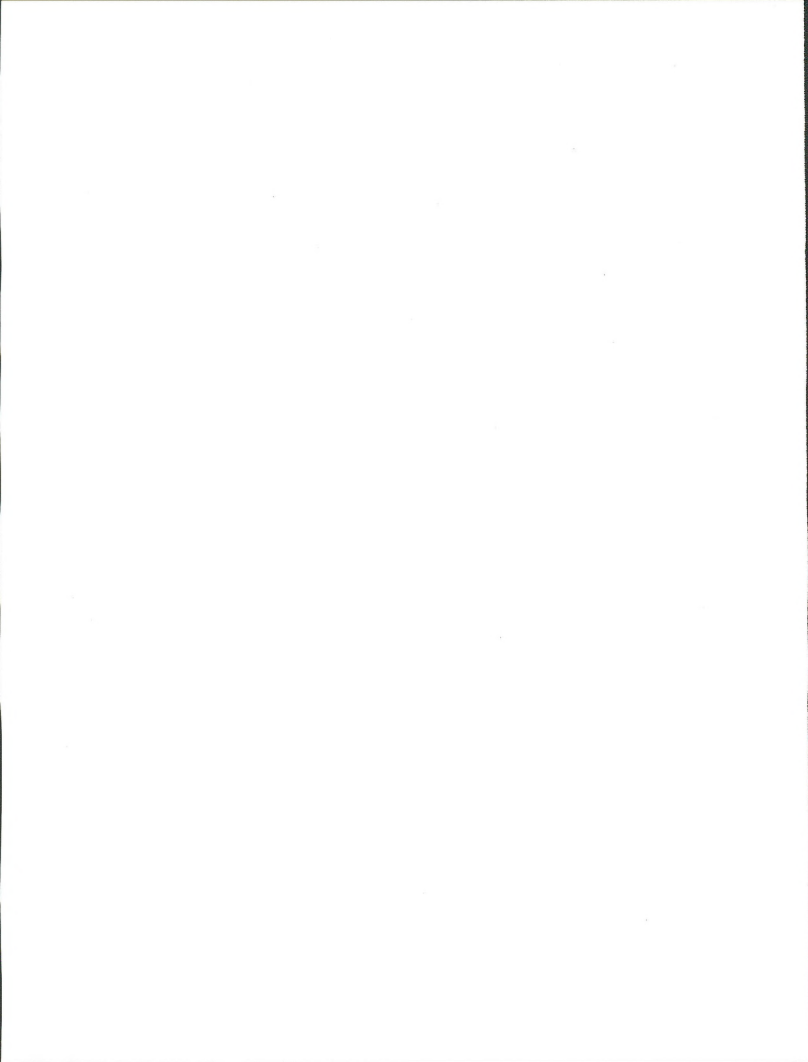


Table of Contents

Chapter 5

Consultation and Coordination

Major Changes from Chapter 5 of the Draft Resource Management Plan	5-1
Introduction	5-1
Summary of Public Comments on the Draft Resource Management Plan	5-1
Summary of Public Comments on the Draft Supplemental Environmental Impact Statement	5-1
List of Agencies and Organizations Contacted and to Whom Copies of the Draft Resource Management Plan Have Been Sent	5-2
Protest Process	5-4
Consistency Review	5-4



Major Changes from Chapter 5 of the Draft Resource Management Plan

The following material was added:

- Guidelines for the protest process;
- Summary of public comments on the draft resource management plan; and
- Summary of public comment analysis for the draft supplemental environmental impact statement

Introduction

The proposed resource management plan was prepared by an interdisciplinary team of specialists from the district office with assistance from the Oregon State Office. Although the actual writing of the draft resource management plan (published August 1992) began in early 1990, an elaborate process that began in 1986 preceded the writing phase. The planning process involved many steps (see chapter 1, Planning Process and Criteria), with public participation, and consultation and coordination with many agencies and organizations.

Summary of Public Comments on the Draft Resource Management Plan

Appendix II contains a reproduction of letters from agencies and elected officials. Due to the volume of comments received, only letters from government agencies and elected officials were reproduced. This is in accordance with BLM and National Environmental Policy Act guidelines. This does not reduce the importance of letters received from nongovernmental individuals or groups. The substantive comments are paraphrased as allowed by the National Environmental Policy Act (40 Code of Federal Regulations 1503.4) to save space.

Appendix JJ contains a list of responders and a summary of comments with BLM responses.

Summary of Public Comment Analysis for the Draft Supplemental Environmental Impact Statement

The following is a brief summary of the public comments and analysis for the SEIS. A detailed description of the public comments and analysis can be found in the final supplemental environmental impact statement released in February 1994.

The BLM was invited to comment on the draft supplemental environmental impact statement along with other state and federal agencies, interest groups, and the public. Public hearings were also held in Oregon, Washington, and California; these hearings received testimony or written comments from 359 individuals. The BLM participated in the coordination of these hearings.

During the 90-day comment period, 101,894 letters were received from 50 states and several foreign countries. Approximately 40 percent of the letters came from east of the Mississippi River, indicating that this issue extends beyond the three states affected.

The subjects that received the most substantive comments included allocations 17.7 percent; ecosystem 15.2 percent; silviculture 9.8 percent; and economic effects 7.7 percent. Comments related to the BLM's draft resource management plans were 0.1 percent.

The comments indicate that feelings and issues surrounding the management of the national forests and BLM-administered lands in Oregon, Washington, and California remain intense and polarized.

List of Agencies and Organizations Contacted and to Whom Copies of the Proposed Resource Management Plan Have Been Sent

The proposed resource management plan team and supporting specialists in the Oregon State Office contacted or received input from the following agencies and organizations during the development of this document and/or the planning steps preceding its development. Copies of the proposed resource management plan have been sent to the following federal and state agencies, local governments and organizations plus many individuals not listed here.

Federal Agencies

Advisory Council on Historic Preservation
Army Corps of Engineers
Bonneville Power Administration
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Mines
Bureau of Reclamation
Department of Justice
Department of the Interior
Environmental Protection Agency
Federal Energy Regulatory Commission
Federal Highway Administration
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
Internal Revenue Service
Minerals Management Service
National Marine Fisheries Service
National Park Service
Regional Environmental Officer
(U.S. Department of Interior)
Small Business Administration
Soil Conservation Service

Federal Senators and Representatives

Senator Mark Hatfield
Senator Robert Packwood
Representative Peter Defazio
Representative Mike Kopetski
Representative Robert Smith
Representative Ron Wyden

State Agencies

Oregon Department of Agriculture
Oregon Department of Economic Development
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Department of Geology and Mineral Industries
Oregon Department of Land Conservation and Development
Oregon Department of Parks and Recreation
Oregon Department of Transportation
Oregon Division of State Lands
Oregon Employment Division
Governor's Forest Planning Team
Office of the Governor
Oregon Coastal Zone Management Association
Oregon Trail Advisory Council
Oregon State Economist
Oregon State Historic Preservation Officer
Oregon State Marine Board
University of California, Berkeley
Oregon Water Resources Department

State Senators and Representatives

Senator Glen Otto
Senator Clifford Trow
Senator Mae Yih
Representative Paul Hanneman
Representative Cedric Hayden
Representative Tim Jose
Representative Rick Kotulski
Representative Hedy Rijken
Representative John Schoon
Representative Robert Shiprack
Representative Tony Van Vleet
Representative Liz Vanleeuwen

Local Government and Other Government Bodies

Association of O&C Counties
Association of Oregon Counties
Cities (including special districts)

Canby	McMinnville	Sheridan
Dallas	Molalla	Siletz
Estacada	Monmouth	Sweet Home
Falls City	Newport	Tillamook
Gates	Philomath	Walport
Independence	Portland	Willamina
Lebanon	Salem	Woodburn
Lyons	Sandy	Yamhill
Mill City	Scappoose	

Confederated Indian Tribes

Grand Ronde
Siletz (Gary Varner)
Warm Springs

Councils of Government

Clatsop-Tillamook
Lane
Mid Willamette

Counties

Benton	Marion
Columbia	Multnomah
Clackamas	Polk
Clatsop	Tillamook
Lane	Washington
Lincoln	Yamhill
Linn	

Organizations

1000 Friends of Oregon
American Fisheries Society
American Rivers
Alsea Valley Alliance
American Forest Council
Associated Oregon Industries
Associated Oregon Loggers
Association of Forest Service Employees
for Environmental Ethics
Association of Oregon Archaeologists
Cascade Holistic Economic Consultants
Cathedral Forest Action Group
Chambers of Commerce
Dallas Salem
Estacada Sandy
Lebanon St. Helens
Molalla Sweet Home
Citizens Interested in Bull Run
Communities for a Greater Oregon
Community Relations Associates, Inc.
Defenders of Wildlife
Duck Creek Association
Friends of Mt. Hood
Friends of the Nestucca
Friends of the Sandy River
Friends of Walker Creek
Friends of the Earth
Girl Scouts of America
Headwaters
Izaak Walton League
Labor Coalition of Environmental Responsibility
League of Women Voters
Local Residents for Old Growth
Lumber & Sawmill Workers Local #2791
Marys Peak Alliance

Mazamas

Molalla River Watch
Molalla Timber Action Committee
Mt. Hood Community Planning Organization
Mt. Hood Recreation Association
National Audubon Society
National Forest Products Association
National Organization for River Sports
National Wildlife Federation
Native Plant Society
Natural Resources Defense Council
Nature Conservancy
Northwest Environmental Defense Center
Northwest Forestry Association
Northwest Mining Association
Northwest Power Planning Council
Northwest Steelheaders
Oregon Bowhunters
Oregon Council Rock and Mineral Clubs
Oregon Equestrian Trails
Oregon Environmental Council
Oregon Forest Industries Council
Oregon Forest Research Institute
Oregon Historical Society
Oregon Hunter's Association
Oregon League of Women Voters
Oregon Natural Heritage Program
Oregon Natural Resources Council
Oregon Rivers Council
Oregon Shores Conservation Coalition
Oregon State University
Oregon Trout Unlimited
Oregon Wildlife Federation
Pacific Northwest 4WD Association
Portland Public Schools
Public Lands Council
Public Lands Foundation
R&E Plant Project
Resource Recovery Group, Inc.
Sierra Club
Sierra Club Legal Defense Fund
Siuslaw Task Force
Siuslaw Timber Operators Association
Society of American Foresters
Tillamook Forest Council
Western Council of Industrial Workers
Western Forest Industries Association
Western Forestry and Conservation Association
Western Wood Products Association
West Valley Citizens for Timber
Wilderness Society
Wildlife Management Institute

Protest Process

The resource management planning process includes an opportunity for administrative review of proposed decisions via a plan protest (see 43 Code of Federal Regulations 1610.5-2). If approval of the proposed resource management plan is believed to be in error, a protest may be filed. Careful adherence to the following guidelines will assist in preparing a protest that will assure consideration of points raised in the protest.

Only those persons or organizations who participated in the planning process leading to this proposed resource management plan may protest. If records indicate a person or organization was not involved in the preparation of the proposed resource management plan, the protest will be dismissed without further review.

A protesting party may raise only those issues which he or she submitted for the record during the planning process. New issues raised in the comment/protest period should be directed to the Salem district manager for consideration in plan implementation, as potential plan amendments, or as otherwise appropriate.

The period for filing a plan protest begins when the Environmental Protection Agency publishes its Notice of Availability for the proposed resource management plan in the Federal Register. The protest period lasts 30 days. There is no provision for any extension of time. To be considered timely, a protest must be postmarked no later than the last day of the protest period. Also, although not a requirement, the protest should be sent by certified mail, and return receipt requested. Protests must be filed in writing to:

Director (760)
Chief, Planning and Environmental Coordination
Bureau of Land Management
1849 C Street NW
Washington DC 20240

A protest must contain, at a minimum, the following information:

- The name, mailing address, telephone number, and interest of the person filing the protest.
- A statement of the issue or issues being protested.
- A statement of the part or parts of the proposed resource management plan being protested. To the extent possible, this should be done by reference to specific pages, paragraphs, sections, tables, maps, etc., included in the document.

- A copy of all documents addressing the issue or issues personally submitted during the planning process or a reference to the date the issue or issues were personally discussed for the record.
- A concise statement explaining why the BLM Oregon state director's decision is believed to be incorrect. This is a critical part of a protest. The protest should document all relevant facts; and reference or cite planning documents, environmental analysis documents, and available planning records (e.g., meeting minutes or summaries, correspondence, etc.). A protest which merely expresses disagreement with the Oregon state director's proposed decision, without any data, will not provide BLM with the benefit of the writer's information and insight. In this case, the director's review will be based on the existing analysis and supporting data.

Consistency Review

Prior to approval of the proposed resource management plan, the Oregon state director will submit this plan to the governor of the state of Oregon and request the governor to identify any known inconsistencies with state or local plans, policies, or programs. The governor will have 60 days to identify inconsistencies and provide recommendations in writing to the state director.

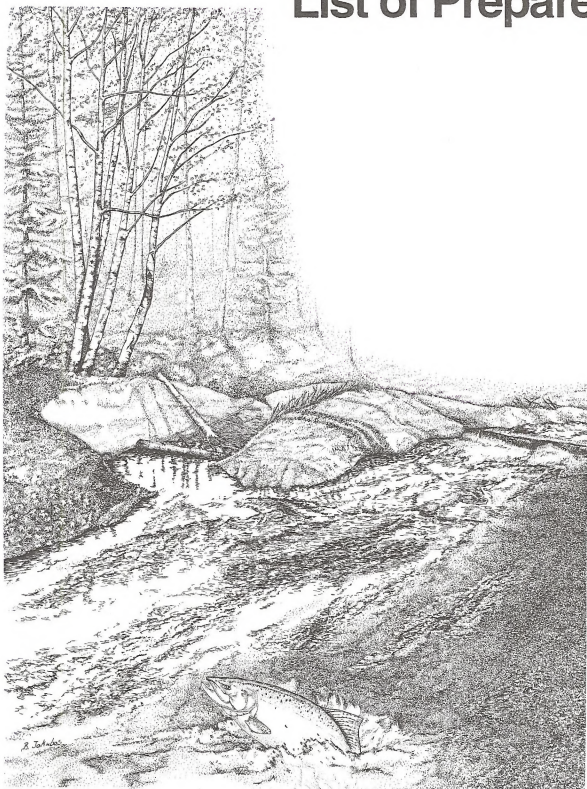
The consistency of this plan with the resource-related plans, programs, and policies of other federal agencies, state and local government and Indian tribes will be reevaluated in the future as part of the formal monitoring and periodic evaluations of the plan.

Chapter 6

Glossary

References Cited

List of Preparers



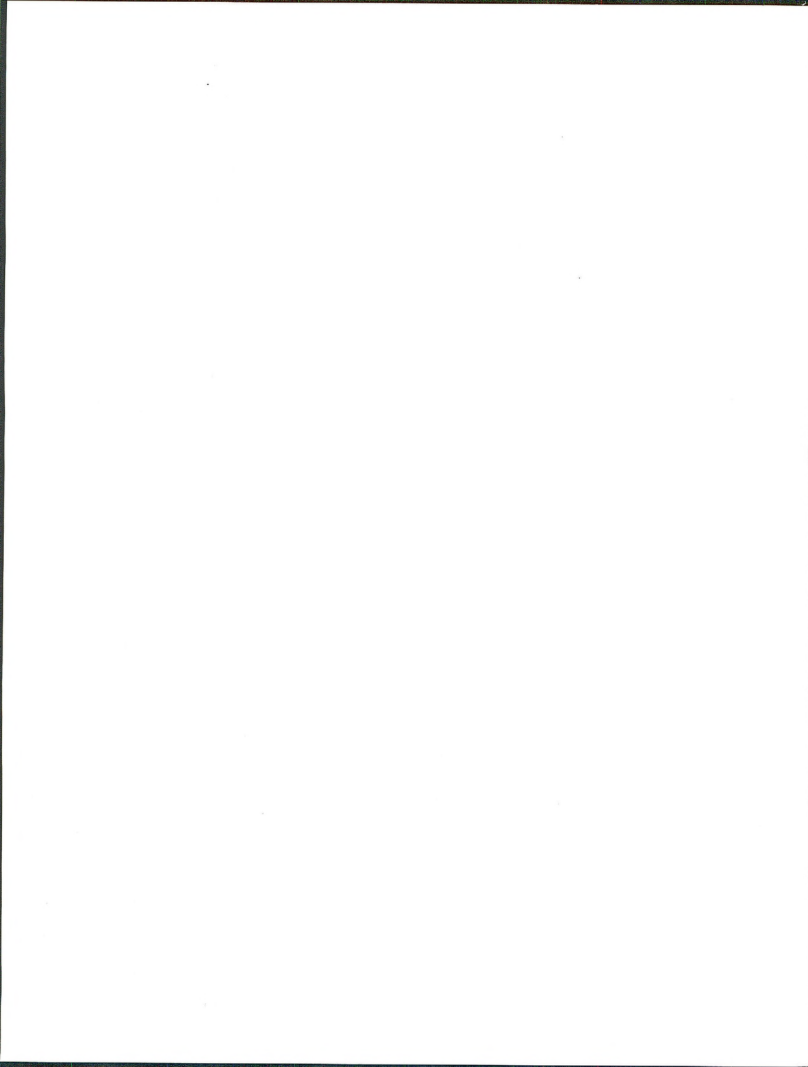


Table of Contents

Chapter 6

Glossary, References Cited and List of Preparers

Glossary	6-1
References Cited	6-19
List of Preparers	6-33



Glossary

Activity Plan - A document which describes management objectives, actions and projects to implement decisions of the resource management plan or other planning documents. Usually prepared for one or more resources in a specific area.

Adaptive Management Areas - Landscape units designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.

Age Class - One of the intervals into which the age range of trees is divided for classification or use.

Airshed - A geographical area which shares the same air mass due to topography, meteorology, and climate.

Allowable Cut Effect - The expected contribution to the probable sale quantity resulting from future treatment of young stands.

Allowable Sale Quantity - The gross amount of timber volume, including salvage, that may be sold annually from a specified area over a stated period of time in accordance with the management plan. Formerly referred to as "allowable cut."

Anadromous Fish - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples.

Analysis of the Management Situation - A document that summarizes important information about existing resource conditions, uses and demands, as well as existing management activities. It provides the baseline for subsequent steps in the planning process, such as the design of alternatives and affected environment.

Analytical Watershed - For planning purposes, a drainage basin subdivision of the planning area used for analyzing cumulative impacts on resources.

Animal Damage - Injuries inflicted upon forest tree seed, seedlings, and young trees through seed foraging, browsing, cutting, rubbing, or trampling; usually by mammals and birds.

Aquatic Ecosystem - Any body of water, such as a stream, lake, or estuary, and all organisms and nonliving components within it, functioning as a natural system.

Aquatic Habitat - Habitat that occurs in free water.

Archaeological Site - A geographic locale that contains the material remains of prehistoric and/or historic human activity.

Area of Critical Environmental Concern - An area of BLM-administered lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural or scenic values, fish and wildlife resources or other natural systems or processes; or to protect life and provide safety from natural hazards. (Also see Potential Area of Critical Environmental Concern.)

Area of Critical Mineral Potential - An area nominated by the public as having mineral resources or potential important to the local, regional, or national economy.

Area Regulation - A method of scheduling timber harvest based on dividing the total acres by an assumed rotation.

Automated Resource Data - Computerized map data used for the management of resources.

Available Forest Land - That portion of the forested acres for which timber production is planned and included within the acres contributing to the probable sale quantity. This includes both lands allocated primarily to timber production and lands on which timber production is a secondary objective.

Back Country Byway - A road segment designated as part of the National Scenic Byway System.

Basal Area - The area of the cross section of a tree stem near its base, generally at breast height, 4.5 feet above the ground and inclusive of bark.

Baseline - The starting point for analysis of environmental consequences; may be the conditions at a point in time (e.g., when inventory data is collected) or may be the average of a set of data collected over a specified period of years.

Basic Resource Unit - A term used in Trim-Plus for the smallest unit of timberland that has been identified in the inventory.

Basin Programs - Sets of state administrative rules that establish types and amounts of water uses allowed in the state's major river basins and form the basis for issuing water rights.

Beneficial Use - The reasonable use of water for a purpose consistent with the laws and best interest of the peoples of the state. Such uses include, but are not limited to, the following: instream, out of stream and ground water uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydro-power, and commercial navigation.

Best Management Practices - Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, best management practices are applied as a system of practices rather than a single practice.

Big Game - Large mammals that are hunted, such as Roosevelt elk, black-tailed deer and black bear.

Biological Diversity - The variety of life and its processes.

Biological Legacies - Components of the forest stand (e.g., large trees, downed logs, and snags) reserved from harvest to maintain site productivity and to provide structure and ecological functions in subsequent forest stands.

Board Foot - A unit of solid wood, one foot square and one inch thick.

Broadcast Burn - Allowing a prescribed fire to burn over a designated area within well defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

Bureau Assessment Species - Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (Oregon Administrative Rule 635-100-040), which are identified in BLM Instruction Memo No. OR-91-57, and are not included as federal candidate, state-listed or bureau sensitive species.

Bureau Sensitive Species - Plant or animal species eligible for federal listed, federal candidate, state-listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the state director.

Candidate Species - Those plants and animals included in Federal Register "Notices of Review" that are being considered by the U.S. Fish and Wildlife Service for listing as threatened or endangered.

There are two categories that are of primary concern to BLM. These are:

- **Category 1.** Taxa for which the U.S. Fish and Wildlife Service has substantial information on hand to support proposing the species for listing as threatened or endangered. Listing proposals are either being prepared or have been delayed by higher priority listing work.
- **Category 2.** Taxa for which the U.S. Fish and Wildlife Service has information to indicate that listing is possibly appropriate. Additional information is being collected.

Casual Use - Activities ordinarily resulting in negligible disturbance of federal lands and resources.

Cavity Excavator - A wildlife species that digs or chips out cavities in wood to provide a nesting, roosting, or foraging site.

Cavity Nesters - Wildlife species, most frequently birds, that require cavities (holes) in trees for nesting and reproduction.

Characteristic Landscape - The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to an agricultural setting, an urban landscape, a primarily natural environment, or a combination of these types.

Class I (air quality) Areas - Special areas (i.e., national parks, certain wilderness areas) protected for their air quality related values.

Clearcut Harvest - A timber harvest method in which all trees are removed in a single entry from a designated area, with the exception of wildlife trees or snags, to create an even-aged stand.

Coastal Oregon Productivity Enhancement Program - A cooperative research and education program to identify and evaluate existing and new opportunities to enhance long-term productivity and economic/social benefits derived from the forest resources of coastal Oregon.

Commercial Forestland - Land declared suitable for producing timber crops and not withdrawn from timber production for other reasons.

Commercial Thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

Commercial Tree Species - Conifer and hardwood species used to calculate the commercial forest land allowable sale quantity. They are typically utilized as saw timber and include species such as Douglas-fir, hemlock, spruce, fir, pine, cedar, alder, and maple (Also see Noncommercial Tree Species).

Commodity Resources - Goods or products of economic use or value.

Community Stability - The capacity of a community (incorporated town or county) to absorb and cope with change without major hardship to institutions or groups within the community.

Community Water System - See Public Water System.

Concern - A topic of management or public interest that is not well enough defined to become a planning issue, or does not involve controversy or dispute over resource management activities or land use allocations or lend itself to designating land use alternatives. A concern may be addressed in analysis, background documents, or procedures or in a non-controversial decision.

Congressionally Reserved Areas - Areas that require congressional enactment for their establishment, such as national parks, wilderness and wild and scenic rivers.

Connectivity - A measure of the extent to which conditions between late-successional/old-growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional/old-growth-associated wildlife and fish species.

Consistency - Under the Federal Land Policy and Management Act, the adherence of BLM resource management plans to the terms, conditions and decisions of officially approved and adopted resource related plans, or in their absence, with policies and programs of other federal agencies, state and local governments and Indian tribes, so long as the plans are also consistent with the purposes, policies and programs of federal laws and regulations applicable to BLM-administered lands. Under the Coastal Zone Management Act, the adherence to approved state management programs to the maximum extent practicable, of federal agency activities affecting the defined coastal zone.

Core Area - That area of habitat essential in the breeding, nesting and rearing of young, up to the point of dispersal of the young.

Cover - Vegetation used by wildlife for protection from predators, or to mitigate weather conditions, or to reproduce. May also refer to the protection of the soil and the shading provided to herbs and forbs by vegetation.

Critical Habitat - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

Crucial Habitat - Habitat which is basic to maintaining viable populations of fish or wildlife during certain seasons of the year or specific reproduction periods.

Cubic Foot - A unit of solid wood, 12 inches square and 12 inches thick.

Cull - A tree or log which does not meet merchantable specifications.

Culmination of Mean Annual Increment - The peak of average yearly growth in volume of a forest stand (total volume divided by age of stand).

Cultural Resource - Any definite location of past human activity identifiable through field survey, historical documentation, or oral evidence; includes archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains.

Cultural Site - Any location that includes prehistoric and/or historic evidence of human use or that has important sociocultural value.

Cumulative Effect - The impact which results from identified actions when they are added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Debris Torrent - Rapid movement of a large quantity of materials (wood and sediment) down a stream channel during storms or floods. This generally occurs in smaller streams and results in scouring of streambed.

Density Management - Cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. Density management harvest can also be used to improve forest health, to open the forest canopy, or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversity is the objective.

Departure (from even flow) - A timber sale level which deviates from sustainable sale levels through a planned temporary increase or decrease in the allowable sale quantity. Must be economically and biologically justified.

Designated Area - An area identified in the Oregon Smoke Management Plan as a principal population center requiring protection under state air quality laws or regulations.

Designated Conservation Area - A contiguous area of habitat to be managed and conserved for spotted owls as described in the U.S. Fish and Wildlife Service's *Final Draft Recovery Plan for the Northern Spotted Owl*.

Developed Recreation Site - A site developed with permanent facilities designed to accommodate recreation use.

Diameter At Breast Height - The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.

Dispersed Recreation - Outdoor recreation in which visitors are diffused over relatively large areas. Where facilities or developments are provided, they are primarily for access and protection of the environment rather than comfort or convenience of the user.

District-Designated Reserves - Areas designated for the protection of specific resources, flora and fauna, and other values. These areas are not included in other land use allocations nor in the calculation of the probable sale quantity.

Domestic Water Supply - Water used for human consumption.

Early Seral Stage - The period from disturbance to crown closure of conifer stands, usually occurring from 0 to 15 years. Grass, herbs, or brush are plentiful.

Ecological Health - The condition of an ecosystem in which processes and functions are adequate to maintain diversity of biotic communities commensurate with those initially found there.

Economically Feasible - Having costs and revenues with a present net value greater than zero.

Ecosystem Diversity - The variety of species and ecological processes that occur in different physical settings.

Ecosystem Management - The management of lands and their resources to meet objectives based on their whole ecosystem function rather than on their character in isolation. Management objectives blend long-term needs of people and environmental values in such a way that the lands will support diverse, healthy, productive and sustainable ecosystems.

Edge Effect - An ecologically biological effect which occurs in the transition zone where two plant communities or successional stages meet and mix.

Effective Old-Growth Habitat - Old-growth forest largely unmodified by external environmental influences (for example, wind, temperature, encroachment of nonresident species) from nearby, younger forest stands. Also referred to as interior habitat. For purposes of analysis, assumed to be at least 400 feet from an edge with an adjacent stand younger than age class 70 years.

Eligible River - A river or river segment found, through interdisciplinary team and, in some cases, interagency review, to meet Wild and Scenic Rivers Act criteria of being free flowing and possessing one or more outstandingly remarkable values.

Endangered Species - Any species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

Environmental Assessment - A systematic analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with National Environmental Policy Act when no environmental impact statement is necessary.

Environmental Impact - The positive or negative effect of any action upon a given area or resource.

Environmental Impact Statement - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major federal action.

Ephemeral Streams - Streams that contain running water only sporadically, such as during and following storm events.

Equivalent Clearcut Acres - A hydrological term which describes the runoff from a watershed in terms of the number of acres of recent clearcut that would be required to yield the same total amount of runoff. Following a clearcut harvest, runoff increases to a peak level, then gradually declines for 20 years. Stands of trees 20 years and older are considered to yield the same runoff as any fully forested site.

Established Stand - A reforestation unit of suitable trees which are past the time when considerable juvenile mortality occurs. The unit is no longer in need of measures to ensure survival but is evaluated for measures to enhance growth.

Even-Aged Management - A silvicultural system which creates forest stands that are primarily of a single age or limited range of ages.

Existing Stand Condition - An artificial classification that groups forest stands with similar management potential into categories matched to tables expressing yield at various stand ages under various combinations of silvicultural treatment.

Extensive Recreation Management Areas - All BLM-administered lands outside special recreation management areas. These areas may include developed and primitive recreation sites with minimal facilities.

Forest Canopy - The cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Forest Health - The ability of forest ecosystems to remain productive, resilient, and stable over time and to withstand the effects of periodic natural or human-caused stresses such as drought, insect attack, disease, climatic changes, flood, resource management practices, and resource demands.

Forest Land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

Forest Succession - The orderly process of change in a forest as one plant community or stand condition is replaced by another, evolving towards the climax type of vegetation.

Fragile Nonsuitable - A Timber Production Capability Classification indicating forest land having fragile conditions, which, if harvested, would result in reduced future productivity; even if special harvest or restrictive measures are applied. These fragile conditions are related to soils, geologic structure, topography, and ground water.

Full Log Suspension - Suspension of the entire log above the ground during yarding operations.

General Forest Management Area - Forest land managed on a regeneration harvest cycle of 70 to 110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health. Commercial thinning would be applied where practicable and where research indicates there would be gains in timber production.

Genetic Diversity - The variety within populations of a species.

Green Tree Retention - A stand management practice in which live trees as well as snags and large down wood, are left as biological legacies within harvest units to provide habitat components over the next management cycle.

High Level - A regeneration harvest designed to retain the highest level of live trees possible while still providing enough disturbance to allow regeneration and growth of the naturally occurring mixture of tree species. Such harvest should allow for the regeneration of intolerant and tolerant species. Harvest design would also retain cover and structural features necessary to provide foraging and dispersal habitat for mature and old growth dependent species.

Low Level - A regeneration harvest designed to retain only enough green trees and other structural components (snag, coarse woody debris, etc.) to result in the development of stands which meet old-growth definitions within 100 to 120 years after harvest entry, considering overstory mortality.

Gross Yarding - Removal of all woody material of specified size from a logging unit to a landing.

Grouped Resource Unit - A term used in Trim-Plus for each collection of current and future management instructions and data sources for the Basic Resource Units which are proposed to be managed to meet a particular set of management objectives.

Habitat Diversity - The number of different types of habitat within a given area.

Habitat Fragmentation - The breaking up of habitat into discrete islands through modification or conversion of habitat by management activities.

Habitat Management Plan - See Activity Plan.

Hardwood Site - A forest site occupied by hardwoods that is unsuitable for the production of conifer species.

Hazardous Materials - Anything that poses a substantive present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.

Hiding Cover - Generally, any vegetation used by wildlife for security or to escape from danger; however, more specifically, any vegetation capable of providing concealment (e.g. hiding 90 percent of an animal) from human view at a distance of 200 feet or less.

Historic Site - A cultural resource resulting from activities or events dating to the historic period (generally post AD 1830 in western Oregon).

Home Range - The area which an animal traverses in the scope of normal activities; not to be confused with territory which is the area an animal defends.

Hyporheic Zone - The area under the stream channel and floodplain that contributes to the stream.

Impact - A spatial or temporal change in the environment caused by human activity.

Improved Seed - Seed originated from a seed orchard or selected tree(s) whose genetic superiority in one or more characters important to forestry has been proven by tests conducted in specific environments.

Infiltration (soil) - The movement of water through the soil surface into the soil.

Instant Study Area - A natural area formally identified by BLM for accelerated wilderness review, by notice published before October 21, 1975.

Integrated Pest Management - A systematic approach that uses a variety of techniques to reduce pest damage or unwanted vegetation to tolerable levels. Integrated pest management techniques may include natural predators and parasites, genetically resistant hosts, environmental modifications and, when necessary and appropriate, chemical pesticides or herbicides.

Integrated Vegetation Management - See Integrated Pest Management.

Intensively Managed Timber Stands - Forest stands managed to obtain a high level of timber volume or quality through investment in growth enhancing practices, such as precommercial thinning, commercial thinning, and fertilization. Not to be confused with the allocations of "lands available for intensive management of forest products."

Intensive Forest Management Practices - The growth enhancing practices of release, precommercial thinning, commercial thinning, and fertilization, designed to obtain a high level of timber volume or quality.

Intensive Timber Production Base - All commercial forest land allocated to timber production and intensively managed to obtain a high level of timber volume or quality.

Intermittent Stream - Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Inventory River - A potential wild, scenic, or recreational river identified in the 1982 Nationwide Rivers Inventory published by the National Park Service.

Irreversible or Irrecoverable Commitment of Resources - Effect of an action or inaction which cannot be reversed within a reasonable time.

Issue - A matter of controversy or dispute over resource management activities that is well defined or topically discrete. Addressed in the design of planning alternatives.

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Landscape - A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout.

Landscape Diversity - The size, shape and connectivity of different ecosystems across a large area.

Landscape Features - The land and water form, vegetation, and structures which compose the characteristic landscape.

Land Use Allocations - Allocations which define allowable uses/activities, restricted uses/activities, and prohibited uses/activities. They may be expressed in terms of area such as acres or miles, etc. Each allocation is associated with a specific management objective.

Large Woody Debris - Pieces of wood larger than ten feet long and six inches in diameter, in a stream channel.

Large Woody Material - Logs on the forest floor in pieces at least 24 inches in diameter at the large end.

Late Seral Stage - See Seral Stages.

Late-Successional Forests - Forest seral stages which include mature and old-growth age classes, 80 years and older.

Late-Successional Reserve - A forest in its mature and/or old-growth stages that has been reserved.

Leasable Minerals - Minerals which may be leased to private interests by the federal government. Includes oil, gas, geothermal resources, and coal.

Locatable Minerals - Minerals subject to exploration, development and disposal by staking mining claims as authorized by the Mining Law of 1872 (as amended). This includes valuable deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Log Decomposition Class - Any of five stages of deterioration of logs in the forest; stages range from essentially sound (class 1) to almost total decomposition (class 5).

Long Term - The period starting 10 years following implementation of the resource management plan. For most analyses, long-term impacts are defined as those existing 100 years after implementation.

Long-Term Soil Productivity - The capability of soil to sustain inherent, natural growth potential of plants and plant communities over time.

Long-Term Sustained Yield - Estimated timber harvest that can be maintained indefinitely, once all stands have been converted to a managed state under a specific management intensity.

Lumber and Wood Products, Except Furniture - An industrial classification which includes logging contractors engaged in cutting timber and pulpwoods: merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are in a different classification.

Major Plant Grouping - An aggregation of plant associations with similar management potential and with the same dominant late seral conifer species and the same major early seral species. Late seral rather than climax species are used because late seral species are usually present rather than climax communities and because most old-growth plant communities on BLM-administered lands are made up of late seral species rather than climax species in the upper canopy.

Management Actions/Direction - Measures planned to achieve the stated objective(s).

Management Activity - An activity undertaken for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using resources.

Management Framework Plan - A land use plan that established coordinated land use allocations for all resource and support activities for a specific land area within a BLM district. It established objectives and constraints for each resource and support activity and provided data for consideration in program planning. This process has been replaced by the resource management planning process.

Management Intensity - An expression of a potential type of management for a Grouped Resource Unit in Trim-Plus, expressed as a yield table.

Mass Movement - The downslope movement of earth caused by gravity. Includes but is not limited to landslides, rock falls, debris avalanches, and creep. It does not include surface erosion.

Matrix Lands - Federal land outside of reserves and special management areas that will be available for timber harvest at varying levels.

Mature Seral Stage - See Seral Stages.

Micro*Storms - A microcomputer data base system providing background information and recommended treatment for each operations inventory unit.

Mid Seral Stage - The period in the life of a forest stand from crown closure to ages 15 to 40 years. Due to stand density, brush, grass, or herbs rapidly decrease in the stand. Hiding cover may be present.

Mineral Estate - The ownership of the minerals at or beneath the surface of the land.

Mineral Potential Classification System - Method for assessing the potential for the presence of a concentration of one or more energy and/or mineral resources.

Minimum Harvest Age - The lowest age of a forest stand to be scheduled for final harvest.

Minimum Stocking - Reforestation level lower than target stocking. Does not achieve full site occupancy in young stands but is capable of achieving optimal final harvest yield and reduced commercial thinning yield.

Minimum Streamflow - The quantity of water needed to maintain the existing and planned in-place uses of water in or along a stream channel or other water body and to maintain the natural character of the aquatic system and its dependent systems.

Mining Claims - Portions of public lands claimed for possession of locatable mineral deposits, by locating and recording under established rules and pursuant to the 1872 Mining Law.

Mitigating Measures - Modifications of actions which:

- avoid impacts by not taking a certain action or parts of an action;
- minimize impacts by limiting the degree or magnitude of the action and its implementation;
- rectify impacts by repairing, rehabilitating or restoring the affected environment;

- reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or
- compensate for impacts by replacing or providing substitute resources or environments.

Monitoring - The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Monitoring/Evaluation - The orderly collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management objectives.

Mortality Salvage - The harvest of dead and dying timber.

Multitaged Stand - A forest stand which has more than one distinct age class arising from specific disturbance and regeneration events at various times. These stands normally will have multilayered structure.

Multilayered Canopy - Forest stands with two or more distinct tree layers in the canopy; also called multistoried stands.

Multiple Use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

Mycorrhizal Fungi - Fungi with a symbiotic relationship with the roots of certain plants.

National Ambient Air Quality Standards - Standards designed to protect public health and welfare, allowing an adequate margin of safety. For particulate matter less than 10 microns in size (PM_{10}), 50 micrograms per cubic meter annual average and 150 micrograms per cubic meter, 24-hour average, not to be exceeded more than once per year.

National Register of Historic Places - A formal list established by the National Historic Preservation Act of 1966 of cultural resources worthy of preservation. The Register is maintained by the National Park Service; and lists archaeological, historic, and architectural properties.

Nonattainment - Failure of a geographical area to attain or maintain compliance with ambient air quality standards.

Nonattainment Area - A geographical area that has failed to attain or maintain compliance with air quality standards. Nonattainment area boundaries are commonly the same as city, standard metropolitan statistical area or county boundaries.

Nonchargeable Volume - Timber harvest not included in the allowable sale quantity calculations.

Noncommercial Forest Land - Land incapable of yielding at least 20 cubic feet of wood per acre per year of commercial species; or land which is capable of producing only noncommercial tree species.

Noncommercial Tree Species - Minor conifer and hardwood species whose yields are not reflected in the commercial conifer forest land allowable sale quantity. Some species may be managed and sold under a suitable woodland allowable sale quantity and, therefore, may be commercial as a woodland species.

Nonforest Land - Land developed for nontimber uses or land incapable of being 10 percent stocked with forest trees.

Nongame Wildlife - All wild vertebrate and invertebrate animals not subject to sport hunting.

Nonpoint Source Pollution - Water pollution that does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation, and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. Such pollution results in

the human-made or human-induced alteration of the chemical, physical, biological, radiological integrity of water.

Nonsuitable Commercial Forest Land - Sites that would take longer than 15 years to meet or exceed minimum stocking levels of commercial species. Further classified as suitable woodland.

Nonsuitable Woodland - All fragile nonsuitable forest land.

Noxious Plant - A plant specified by law as being especially undesirable, troublesome, and difficult to control.

Noxious Weed - See Noxious Plant.

Nutrient Cycling - Circulation or exchange of elements such as nitrogen and carbon between nonliving and living portions of the environment. Includes all mineral and nutrient cycles involving mammals and vegetation.

Nutrient Depletion - Detrimental changes on a site in the total amount of nutrients and/or their rates of input, uptake, release, movement, transformation, or export.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently reverted to the United States.

Objectives - Expressions of what are the desired end results of management efforts.

Obligate Species - A plant or animal that occurs only in a narrowly defined habitat such as tree cavity, rock cave, or wet meadow.

Off-Highway Vehicle - Any motorized track or wheeled vehicle designed for cross country travel over natural terrain. The term "Off-Highway Vehicle" will be used in place of the term "Off-Road Vehicle" to comply with the purposes of Executive Orders 11644 and 11989. The definition for both terms is the same.

Off-Highway Vehicle Designation:

- **Open:** Designated areas and trails where off-highway vehicles may be operated subject to operating regulations and vehicle standards set forth in BLM Manuals 8341 and 8343.
- **Limited:** Designated areas and trails where off-highway vehicles are subject to restrictions limiting the number or types of vehicles, date, and time of

use; limited to existing or designated roads and trails.

- **Closed:** Areas and trails where the use of off-highway vehicles is permanently or temporarily prohibited. Emergency use is allowed.

Old-Growth Conifer Stand - Older forests occurring on western hemlock, mixed conifer, or mixed evergreen sites which differ significantly from younger forests in structure, ecological function, and species composition. Old-growth characteristics begin to appear in unmanaged forests at 175 to 250 years of age. These characteristics include:

- a patchy, multilayered canopy with trees of several age classes;
- the presence of large living trees;
- the presence of larger standing dead trees (snags) and down woody debris; and
- the presence of species and functional processes which are representative of the potential natural community.

For purposes of inventory, old-growth stands on BLM-administered lands are only identified if they are at least ten percent stocked with trees of 200 years or older and are ten acres or more in size. For purposes of habitat or biological diversity, the BLM uses the appropriate minimum and average definitions provided by Pacific Northwest Experiment Station publications 447 and GTR-285. This definition is summarized from the 1986 interim definitions of the Old-Growth Definitions Task Group.

Old-Growth Seral Stage - See Seral Stages.

Old-Growth-Dependent Species - An animal species so adapted that it can exist only in old-growth forests.

Operations Inventory - An intensive, site-specific forest inventory of forest stand location, size, silvicultural needs, and recommended treatment based on individual stand conditions and productivity.

Operations Inventory Unit - An aggregation of trees occupying an area that is sufficiently uniform in composition, age, arrangement, and condition to be distinguishable from vegetation on adjoining areas.

Optimal Cover - For elk, cover used to hide from predators and avoid disturbances, including man. It consists of a forest stand with four layers and an overstory canopy which can intercept and hold a substantial amount of snow, yet has dispersed, small

openings. It is generally achieved when the dominant trees average 21 inches diameter at breast height or greater and have 70 percent or greater crown closure.

Outstanding Natural Area - An area that contains unusual natural characteristics and is managed primarily for educational and recreational purposes.

Outstandingly Remarkable Values - Values among those listed in Section 1(b) of the Wild and Scenic Rivers Act: "scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values—" Other similar values which may be considered include ecological, biological or botanical, paleontological, hydrological, scientific or research.

Overstory Removal - The final stage of cutting where the remaining overstory trees are removed to allow the understorey to grow. Overstory removal is generally accomplished three to five years after reforestation and when adequate stocking has been achieved.

Paper and Allied Products - An industrial classification which includes establishments primarily engaged in the manufacture of pulps from wood and other cellulose fibers, and from rags; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes, and envelopes.

Partial Cutting - Removal of selected trees from a forest stand.

Partial Log Suspension - During yarding operations, suspension of one end of the log above the ground.

Particulates - Finely divided solid or liquid (other than water) particles in the air.

Peak Flow - The highest amount of stream or river flow occurring in a year or from a single storm event.

Perennial Stream - A stream that has running water on a year-round basis under normal climatic conditions.

Personal Income - The income received by all individuals in the economy from all sources. Made up of wages and salaries, proprietors income, rental income, dividends, personal interest income, and the difference between transfer payments (payouts) and personal contributions for social insurance.

Plan Amendment - A change in the terms, conditions or decisions of a resource management plan.

Plan Maintenance - Any documented minor change which interprets, clarifies, or refines a decision within a resource management plan but does not change the scope or conditions of that decision.

Plan Revision - A new resource management plan prepared by following all steps required by the regulations for preparing an original resource management plan.

Planning Area - All of the lands within the BLM management boundary addressed in a BLM resource management plan; however, BLM planning decisions apply only to BLM-administered lands and mineral estate.

Planning Issue - See Issue.

Plant Association - A plant community type based on land management potential, successional patterns, and species composition.

Plant Community - An association of plants of various species found growing together in different areas with similar site characteristics.

Plantation Maintenance - Actions in an unestablished forest stand to promote the survival of desired crop trees.

Plantation Release - All activities associated with promoting the dominance and/or growth of desired tree species within an established forest stand.

Pool/Riffle Ratio - The ratio of surface area or length of pools to the surface area or length of riffles in a given stream reach; frequently expressed as the relative percentage of each category. Used to describe fish habitat rearing quality.

Potential Area of Critical Environmental Concern - An area of BLM-administered land that meets the relevance and importance criteria for area of critical environmental concern designation, as follows:

- Relevance. There shall be present a significant historic, cultural, or scenic value; a fish or wildlife resource or other natural system or process; or natural hazard.
- Importance. The above described value, resource, system, process, or hazard shall have substantial significance and values. This generally requires qualities of more than local significance and

special worth, consequence, meaning, distinctiveness, or cause for concern. A natural hazard can be important if it is a significant threat to human life or property.

Potential Natural Community - The community of plants and wild animals which would become established if all successional sequences were completed without interference by man under present environmental conditions. For forest communities, the potential natural community is an old-growth conifer stand.

Precommercial Thinning - The practice of removing some of the trees less than merchantable size from a stand so that remaining trees will grow faster.

Prescribed Fire - A fire burning under specified conditions that will accomplish certain planned objectives.

Prevention Strategy(ies) - The amelioration of conditions that cause or favor the presence of competing or unwanted vegetation.

Priority Animal Taxa - Species or subspecies having special significance for management. They include endangered, threatened and special status species; species of high economic or recreation value; and species of significant public interest.

Priority Habitats - Aquatic, wetland and riparian habitats, and habitats of priority animal taxa.

Probable Sale Quantity - Probable sale quantity estimates the allowable harvest levels for the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration were followed. "Allowable" was changed to "probable" to reflect uncertainty in the calculations for some alternatives. Probable sale quantity is otherwise comparable to allowable sale quantity. However, probable sale quantity does not reflect a commitment to a specific cut level. Probable sale quantity includes only scheduled or regulated yields and does not include "other wood" or volume of cull and other products that are not normally part of allowable sale quantity calculations.

Progeny Test Site - A test area for evaluating parent seed trees by comparing the growth of their offspring seedlings.

Proposed Threatened or Endangered Species - Plant or animal species proposed by the U.S. Fish and Wildlife Service to be biologically appropriate for

listing as threatened or endangered, and published in the Federal Register. It is not a final designation.

Public Domain Lands - Original holdings of the United States never granted or conveyed to other jurisdictions, or reacquired by exchange for other public domain lands.

Public Water System - A system providing piped water for public consumption. Such a system has at least fifteen service connections or regularly serves at least twenty-five individuals.

Rearing Habitat - Areas in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

Recovery Plan - A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act, to improve the status of the species to make continued listing unnecessary.

Recreational River - See Wild and Scenic Rivers System.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial stocking.

Regeneration Harvest - Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species will be reestablished.

Regeneration Period - The time it takes to harvest and reforest an area to adequate stocking following a timber sale.

Regional Ecosystem Office - The main function of this office is to provide staff work and support to the Regional Interagency Executive Committee so the standards and guidelines in the forest management plan can be successfully implemented.

Regional Interagency Executive Committee - This group serves as the senior regional entity to assure the prompt, coordinated and successful implementation of the forest management plan standards and guidelines at the regional level.

Regulated Forest - A forest which comprises an even distribution of age classes or tree sizes, when the growth equals the cut (at the highest level sustainable) and when the level of growing stock remains relatively constant.

Representative Timber Management Scenario - A set of assumed timber harvest units, road locations and average annual levels of associated practices and intensive management practices for the decade of the expected life of the plan.

Research Natural Area - An area that contains natural resource values of scientific interest and is managed primarily for research and educational purposes.

Reserved Federal Mineral Estate - Land on which the federal government has ownership of minerals but the surface estate is private or other nonfederal ownership.

Resource Management Plan - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

Responding Effects - The jobs and income generated by the purchase of goods and services by businesses or employees in the sector(s) being examined. Example: Purchases of legal services by wood products companies and their employees is a responding effect that creates jobs and income for attorneys.

Restoration and Retention Blocks - Ecological reserves managed to restore or retain old growth communities and respective plant communities.

Right-of-Way - A permit or an easement that authorizes the use of public lands for specified purposes, such as pipelines, roads, telephone lines, electric lines, reservoirs, and the lands covered by such an easement or permit.

Riparian Management Area - An area allocated in the plan primarily to protect the riparian and/or streamside zone.

Riparian Reserves - Designated riparian areas found outside Late-Successional Reserves.

Riparian Zone - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs and wet meadows.

Ripping - The process of breaking up or loosening compacted soil to assure better penetration of roots of young tree seedlings.

Rotation - The planned number of years between establishment of a forest stand and its regeneration harvest.

Rural Interface Areas - Areas where BLM-administered lands are adjacent to or intermingled with privately owned lands zoned for 1 to 20-acre lots or that already have residential development.

Salable Minerals - High volume, low value mineral resources including common varieties of rock, clay, decorative stone, sand, and gravel.

Scarification - Mechanical removal of competing vegetation or interfering debris prior to planting.

Scenic Quality - The relative worth of a landscape from a visual perception point of view.

Scenic River - See Wild and Scenic Rivers System.

Scribner Short Log - A log measurement rule constructed from diagrams which shows the number of one-inch boards that can be drawn in a circle representing the small end of a 16-foot-long log, assumes a one-quarter inch saw kerf groove, makes a liberal allowance for slabs, and disregards log taper.

Sediment Yield - The quantity of soil, rock particles, organic matter, or other debris transported through a cross-section of stream in a given period of time. Measured in dry weight or by volume. Consists of suspended sediment and bedload.

Seed Tree Cutting Method - An even-aged reproductive cutting method in which all mature timber from an area is harvested in one entry except for a small number of trees left as a seed source for the harvested area.

Seed Orchard - A plantation of clones or seedlings from selected trees; isolated to reduce pollination from outside sources, weeded of undesirables, and cultured for early and abundant production of seed.

Selection Cutting - A method of uneven-aged management involving the harvesting of single trees from stands (single-tree selection) or in groups (group selection) without harvesting the entire stand at any one time.

Sensitivity Analysis - A process of examining specific tradeoffs which would result from making changes in single elements of a plan alternative.

Sensitivity Levels - Measures (e.g., high, medium, and low) of public concern for the maintenance of scenic quality.

Seral Stages - The series of relatively transitory plant communities which develop during ecological succession from bare ground to the climax stage.

There are five stages:

- **Early Seral Stage** - The period from disturbance to crown closure of conifer stands managed under the current forest management regime. Grass, herbs, or brush are plentiful.
- **Mid Seral Stage** - The period in the life of a forest stand from crown closure to first merchantability. Usually ages 15 through 40. Due to stand density, brush, grass or herbs rapidly decrease in the stand. Hiding cover may be present.
- **Late Seral Stage** - The period in the life of a forest stand from first merchantability to culmination of mean annual increment. This is under a regime including commercial thinning, or to 100 years of age, depending on wildlife habitat needs. During this period, stand diversity is minimal, except that conifer mortality rates will be fairly rapid. Hiding and thermal cover may be present. Forage is minimal.
- **Mature Seral Stage** - The period in the life of a forest stand from culmination of mean annual increment to an old-growth stage or to 200 years. This is a time of gradually increasing stand diversity. Hiding cover, thermal cover, and some forage may be present.
- **Old-Growth** - This stage constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. For forest communities, this stage exists from approximately age 200 until when stand replacement occurs and secondary succession begins again. Depending on fire frequency and intensity, old-growth forests may have different structures, species composition and age distributions. In forests with longer periods between natural disturbance, the forest structure will be more even-aged at late mature or early old growth stages.

Shelterwood Cutting - A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and/or protection during the period of regeneration. The mature stand is removed in two or more cuttings.

Short Term - The period of time during which the Resource Management Plan will be implemented; assumed to be ten years.

Silvicultural Prescription - A professional plan for controlling the establishment, composition, constitution and growth of forests.

Silvicultural System - A planned sequence of treatments over the entire life of a forest stand needed to meet management objectives.

Site Class - A measure of an area's relative capacity for producing timber or other vegetation.

Site Index - A measure of forest productivity expressed as the height of the tallest trees in a stand at an index age.

Site Preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment which is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods.

Skid Trail - A pathway created by dragging logs to a landing (gathering point).

Skyline Yarding - A cable yarding system using one of the cables to support a carriage from which logs are suspended and then pulled to a landing.

Slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging.

Slope Failure - See Mass Movement.

Smoke Management - Conducting a prescribed fire under suitable fuel moisture and meteorological conditions with firing techniques that keep smoke impact on the environment within designated limits.

Smoke Management Program - A program designed to ensure that smoke impacts on air quality from agricultural or forestry burning operations are minimized; that impacts do not exceed, or significantly contribute to, violations of air quality standards or visibility protection guidelines; and that necessary open burning can be accomplished to achieve land management goals.

Smoke Sensitive Area - An area identified by the Oregon Smoke Management Plan that may be negatively affected by smoke but is not classified as a designated area.

Snag - Any standing dead, partially-dead, or defective (cull) tree at least 10 inches in diameter at breast height and at least 6 feet tall. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

Snag Dependent Species - Birds and animals dependent on snags for nesting, roosting, or foraging habitat.

Soil Compaction - An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration, or pressure.

Soil Displacement - The removal and horizontal movement of soil from one place to another by mechanical forces such as a blade.

Soil Productivity - Capacity or suitability of a soil for establishment and growth of a specified crop or plant species, primarily through nutrient availability.

Soil Series - A group of soils developed from a particular type of parent material; having naturally developed horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement of the profile.

Special Areas - Areas that may need special management, which may include management as an area of critical environmental concern, research natural area, outstanding natural area, environmental education area, or other special category.

Special Forest Products - Firewood, cedar shake bolts, mushrooms, ferns, floral greens, berries, mosses, bark, grasses, etc., that could be harvested in accordance with the objectives and guidelines in the proposed resource management plan.

Special Habitat Features - Habitats of special importance due to their uniqueness or high value.

Special Recreation Management Area - An area where a commitment has been to provide specific recreation activity and experience opportunities. These areas usually require a high level of recreation investment and/or management. They include

recreation sites but recreation sites alone do not usually constitute special recreation management areas.

Special Status Species - Plant or animal species falling in any of the following categories (see separate glossary definitions for each):

- Threatened or Endangered Species
- Proposed Threatened or Endangered Species
- Candidate Species
- State-Listed Species
- Bureau Sensitive Species
- Bureau Assessment Species

Species Diversity - The number, different kinds and relative abundance of species.

Split Estate - An area of land where the surface is nonfederally owned and the subsurface mineral resources are federally owned or vice versa.

Spotted Owl Habitat Sites - Sites monitored by BLM for spotted owl occupancy during some or all of the years 1985 through 1988, in accordance with BLM's spotted owl monitoring guidelines. These sites are known to have been inhabited by spotted owls at some time in the last dozen years, but not necessarily during the 1985-1988 period.

Stand (Tree Stand) - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

Stand Density - An expression of the number and size of trees on a forest site. May be expressed in terms of numbers of trees per acre, basal area, stand density index, or relative density index.

State Historic Preservation Officer - The state official authorized to act as a liaison to the Secretary of the Interior for purposes of implementing the National Historic Preservation Act of 1966.

State Implementation Plan - A state document, required by the Clean Air Act. It describes a comprehensive plan of action for achieving specified air quality objectives and standards for a particular locality or region within a specified time, as enforced by the state and approved by the Environmental Protection Agency.

State-Listed Species - Plant or animal species listed by the state of Oregon as threatened or endangered pursuant to ORS 496.004, ORS 498.026, or ORS 564.040.

Statewide Comprehensive Outdoor Recreation Plan (SCORP) - A plan prepared by the state, which describes and analyzes the organization and function of the outdoor recreation system of the state. The plan provides an analysis of the roles and responsibilities of major outdoor recreation suppliers; an analysis of demand, supply and needs; issue discussions; an action program to address the issues; and a project selection process.

Stocked/Stocking - A measure of the number and spacing of trees in a forest stand.

Strategic and Critical Minerals - Minerals which supply military, industrial and essential civilian needs of the United States during a national defense emergency. They are not found or produced in this country in sufficient quantities to meet such needs. Nickel, cobalt, and chromium are examples of such minerals occurring in western Oregon.

Stream Class - A system of stream classification established in the Oregon Forest Practices Act. Class I streams are those which are significant for: (1) domestic use; (2) angling; (3) water dependent recreation; and (4) spawning, rearing or migration of anadromous or game fish. All other streams are class II. Class II special protection streams (class II SP) are class II streams which have a significant summertime cooling influence on downstream class I waters which are at or near a temperature at which production of anadromous or game fish is limited.

Stream Order - A hydrologic system of stream classification based on stream branching. Each small unbranched tributary is a first order stream. Two first order streams join to make a second order stream. Two second order streams join to form a third order stream and so forth.

Stream Reach - An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of one-half to one and one-half miles in length unless channel character, confluence distribution, or management considerations require variance.

Structural Diversity - Variety in a forest stand that results from layering or tiering of the canopy and the die-back, death and ultimate decay of trees. In aquatic habitats, the presence of a variety of structural features such as logs and boulders that create a variety of habitat.

Succession - A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development of series of plant communities (called seral stages) following a major disturbance.

Suitable Commercial Forest Land - Commercial forest land capable of sustained long-term timber production.

Suitable River - A river segment found, through administrative study by an appropriate agency, to meet the criteria for designation as a component of the National Wild and Scenic Rivers system, specified in section 4(a) of the Wild and Scenic Rivers Act.

Suitable Woodland - Forest land occupied by minor conifer and hardwood species not considered in the commercial forest land allowable sale quantity determination and referred to as noncommercial species. These species may be considered commercial for fuelwood, etc. under woodland management. Also included are low site and nonsuitable commercial forest land. These lands must be biologically and environmentally capable of supporting a sustained yield of forest products.

Surface Erosion - The detachment and transport of soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a uniform layer (sheet erosion), in many rills, or by dry ravel.

Suspended Sediment - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Sustained Yield Unit - An administrative division for which an allowable sale quantity is calculated.

Target Stocking - The desirable number of well-spaced trees per acre at age of first commercial thinning.

Ten Percent Stocked - Stocking of tree seedlings and saplings (one-half inches in diameter 4.5 feet above the ground) that are well distributed over the land and are more than 30 per acre in number. Or the stocking of trees larger than 5 inches in diameter with foliage that covers at least 10 percent of the land surface area.

Texture (soil) - The relative proportion of sand, silt, and clay in a soil; grouped into standard classes and subclasses in the U.S. Department of Agriculture *Soil Survey Manual*.

Thermal Cover - Cover used by animals to lessen the effects of weather. For elk, a stand of conifer trees which are 40 feet or more tall with an average crown closure of 70 percent or more. For deer, cover may include saplings, shrubs or trees at least 5 feet tall with 75 percent crown closure.

Threatened Species - Any species defined through the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range and published in the Federal Register.

Timber Management Plan - An activity plan that specifically addresses procedures related to the offering and sale of timber volume consistent with the approved allowable sale quantity.

Timber Production Capability Classification - The BLM process of partitioning forestland into major classes indicating relative suitability to produce timber on a sustained yield basis.

Total Suspended Particulates - All solid or semi-solid material found in the atmosphere.

Transportation System - Network of roads used to manage BLM-administered lands. Includes BLM-controlled roads and some privately controlled roads. Does not include Oregon Department of Transportation, county, and municipal roads.

Travel Corridor - A route used by animals along a belt or band of suitable cover or habitat.

Understocked - The condition when a plantation of trees fails to meet the minimum requirements for number of well spaced trees per acre.

Uneven-Aged Management - A combination of actions that simultaneously maintains continuous tall forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unique Ecosystems - Ecosystems embracing special habitat features such as beaches and dunes, talus slopes, meadows, and wetlands.

Unnecessary or Undue Degradation - Surface disturbance greater than what would normally result when a mineral exploration or development activity regulated under 43 Code of Federal Regulations 3809 is being accomplished by a prudent operator in usual, customary and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, outside the area of operations. Failure to initiate and complete reasonable mitigation measures, including reclamation of disturbed areas; or failure to prevent the creation of a nuisance, which may constitute unnecessary or undue degradation. Failure to comply with applicable environmental protection statutes and regulations thereunder will constitute unnecessary or undue degradation.

Utility Corridor - A linear strip of land identified for the present or future location of utility lines within its boundaries.

Viable Population - A wildlife or plant population that contains an adequate number of reproductive individuals to appropriately ensure the long-term existence of the species.

Viewshed - The landscape that can be directly seen from a viewpoint or along a transportation corridor.

Visibility Protection Plan - A plan that implements the requirements of the Clean Air Act by establishing programs for visibility monitoring; short and long term control strategies; and procedures for program review, coordination, and consultation.

Visual Resources - The visible physical features of a landscape.

Visual Resource Management - The inventory and planning actions to identify visual values and establish objectives for managing those values and the management actions to achieve visual management objectives.

Visual Resource Management Classes - Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective that prescribes the amount of modification allowed in the landscape.

Water Quality - The chemical, physical, and biological characteristics of water.

Water Yield - The quantity of water derived from a unit area of watershed.

Western Oregon Digital Data Base - A very high resolution (1 inch = 400 feet) geographic digital (computer) data base derived from aerial photography for BLM-administered lands in western Oregon.

Wetlands or Wetland Habitat - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for living in saturated soil conditions. Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas.

Wet Meadows - Areas where grasses predominate. Normally waterlogged within a few inches of the ground surface.

Wild and Scenic Rivers System - A national system of rivers or river segments that have been designated by Congress and the President as part of the National Wild and Scenic Rivers System (Public Law 90-542, 1968). Each designated river is classified as one of the following:

- **Wild River Area.** A river or section of a river free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Designated wild as part of the National Wild and Scenic Rivers System.
- **Scenic River Area.** A river or section of a river free of impoundments, with shorelines or watersheds still largely primitive and undeveloped but accessible in places by roads. Designated scenic as part of the National Wild and Scenic Rivers System.
- **Recreational River Area.** A river or section of a river readily accessible by road or railroad, that may have some development along its shorelines, and that may have undergone some impoundment or diversion in the past. Designated recreational as part of the National Wild and Scenic Rivers System.

Wilderness Study Area - A roadless area inventoried and found to be wilderness in character, having few human developments and providing outstanding opportunities for solitude and primitive recreation, as described in Section 603 of the Federal Land Policy and Management Act and in Section 2(c) of the Wilderness Act of 1964.

Wildlife Tree - A live tree retained to become future snag habitat.

Wild River - See Wild and Scenic Rivers System.

Windthrow - A tree or trees uprooted or felled by the wind.

Withdrawal - A designation which restricts or closes public lands from the operation of land or mineral disposal laws.

Woodland - Forest land producing trees not typically used as saw timber products and not included in calculation of the commercial forest land allowable sale quantity.

Yarding - The act or process of moving logs to a landing.

Yield Table - A table of timber volumes expected to be produced under a certain set of conditions.

References Cited

- Alaback, P.
1989. Logging of temperate rain forests and the greenhouse effect: ecological factors to consider. In E.B. Alexander (ed.). Proceedings of the Watershed '89 Symposium. U.S. Department of Agriculture, Forest Service, Region 10, March 1989, Juneau, Alaska. pp. 195-202.
- Allen, H.L. and L.W. Brewer
1985. A review of current northern spotted owl (*Strix occidentalis caurina*) research in Washington State. In R.J. Gutierrez and A.B. Carey (technical editors). Ecology and management of the spotted owl in the Pacific Northwest. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-185, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 55-57.
- Allen, H.L., K. Dixon, K.E. Knutsen, and A.E. Potter
1987. Cooperative administrative study to monitor spotted owl management areas in national forests in Washington. Progress Report No. 3. Washington Department of Wildlife.
- Amaranthus, M.P., J.M. Trappe, and R.J. Molina
1989. Long-term productivity and the living soil. In D.A. Perry et al. (eds.). Maintaining the long-term productivity of the Pacific Northwest forest ecosystems. Timber Press.
- Amaranthus, M.P. and D.A. Perry
1990. Influence of vegetation type and madrone soil inoculum on associative nitrogen fixation in Douglas-fir rhizospheres. Paper No. 2335. Forest Research Laboratory, Oregon State University, Corvallis, Oregon.
- Andelman, S. and A. Stock
1993. Management, research and monitoring priorities for the conservation of neotropical migratory birds that breed in Washington state. Washington Natural Heritage Program, Washington Department of Natural Resources, Olympia, Washington.
- Anderson, R.
1989. Personal communication to Roger Monthey.
- Andrus, C.W. and H.A. Froehlich
1983. An evaluation of four implements used to till compacted forest soils in the Pacific Northwest.
- Andrus, C.W. and H.A. French
1988. Woody debris and its contribution to pool formation in a coastal stream 50 years after logging. Canadian Journal of Fish. Aquatic Sciences 45:2080-2086.
- Anthony, R.G., R.L. Knight, G.T. Allen, B.R. McClelland, and J.I. Hodges
1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. In 47th North American Wildlife and Natural Resources Conference Transcript. Wildlife Management Institute, Washington, D.C. pp. 332-342.
- Anthony, R.G. and F.B. Isaacs
1988. Characteristics of bald eagle nest sites in Oregon Journal of Wildlife Management. 53(1):148-159.
- Applegarth, J.
1991. Review of reptiles and amphibians on BLM-administered lands. Unpublished report. U.S. Department of the Interior, BLM, Eugene District, Eugene, Oregon.
- Aubry, K.B. and P.A. Hall
1991. Terrestrial amphibian communities in the southern Washington Cascade Range. In Wildlife and Vegetation of Unmanaged Douglas-fir Forests. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR 285. pp. 327-328.
- Barrows, C.W. and K. Barrows
1978. Roost characteristics and behavioral thermo-regulation in the spotted owl. Western Birds 9(1):1-8.
- Barrows, C.W.
1981. Roost selection by spotted owls: an adaptation to heat stress. Condor 83:302-309.
- Bilby, R.E. and J.W. Ward
1989. Changes in characteristics and function of woody debris with increasing stream size in western Washington. Transcript, American Fisheries Society 118:368-378.
- Bisson, P.A., R.E. Bilby, M.D. Bryant, C.A. Dolloff, G.B. Grette, R.A. House, M.L. Murphy, K.V. Koski, and J.R. Sedell
1987. Large woody debris in forested streams in the Pacific Northwest: past, present, and future. In Proceedings of a symposium; streamside management-forestry and fisheries interactions: 1986. University of Washington, Seattle, Washington. pp. 143-190.

- Blockstein, D.
1989. Toward a federal plan for biological diversity. Issues in Science and Technology, Volume V, No. 4: 63-67.
- Borchers, S. and D.A. Perry
1990. Growth and ectomycorrhiza formation of Douglas-fir seedlings grown in soils collected at different distances from pioneering hardwoods in southwest Oregon clearcuts. Paper No. 2444, Forest Research Laboratory, Oregon State University, Corvallis, Oregon.
- Borchers, J.D. Perry, P. Sollins, G. Koerper, and K. Cromack, Jr.
1990. Effects of harvesting and burning on carbon and nitrogen status in soil and forest floor layers: implications for long-term site productivity. Canadian Journal Forest Resources. In press.
- Brewer, L.W.
1985. Home range size and habitat use of northern spotted owls (*Strix occidentalis caurina*) in Washington. In Raptor Research Foundation Symposium on the Management of Birds of Prey, Session 11: The biology, status, and management of owls. November 9-10, 1985. Sacramento, California (Abstr.).
- Brown, E.R. (ed.)
1985. Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Department of Agriculture, Forest Service, Publication No. R6-F&WL-192-1985. Pacific Northwest Region, Portland, Oregon.
- Bruce, C., D. Edwards, K. Mellen, A. McMillan, T. Owens, and H. Sturgis
1985. Wildlife relationships to plant communities and stand conditions. In E.R. Brown (ed.). Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Department of Agriculture, Forest Service, Publication No. R6-F&WL-192-1985, Pacific Northwest Region, Portland, Oregon. pp. 33-55.
- Burroughs, E.R., Jr. and B.R. Thomas
1977. Declining roof strength in Douglas-fir after felling as a factor in slope stability. Research Paper INT-90. U.S. Department of Agriculture, U.S. Forest Service Intermountain Forest and Range Experiment Station, Ogden, Utah. 27 pp.
- Bury, R.B., P.S. Corn, and K.B. Aubry
1991. Regional patterns of terrestrial amphibian communities in Oregon and Washington. In Wildlife and Vegetation of Unmanaged Douglas-fir Forests. U.S. Department of Agriculture, Forest Service. General Technical Report PNW 285, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 341-350.
- Butler, M.
1986. Peak/risk/culvert. BLM Technical Note 374.
- Campbell, A.G. and J.F. Franklin
1979. Riparian vegetation in Oregon's western Cascade Mountains: composition, biomass, and autumn phenology. Bulletin No. 14, Coniferous forest biome, ecosystem analysis studies. University of Washington, Seattle, Washington.
- Carey, A.B.
1985. A summary of the scientific basis for spotted owl management. In R.J. Gutierrez and A.B. Carey (technical editors). Ecology and management of the spotted owl in the Pacific Northwest. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-185, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 100-114.
- Carey, A.B., L.L.C. Jones, B.L. Biswell, R.B. Bury, P.S. Corn, R.G. Anthony and K. Nelson
1986. Vertebrate community studies: Oregon Coast Range. In fiscal year 1986 Annual Report, Forest Sciences Laboratory, U.S. Department of Agriculture, Forest Service, No. 4050 Research. pp. 31-34.
- Carey, A.B., L.L.C. Jones, B.L. Biswell, and J.A. Reid
1986a. The ecology of spotted owls and their prey in the Coast Range. In fiscal year 1986 Annual Report, Forest Sciences Laboratory, U.S. Department of Agriculture, Forest Service, No. 4050 Research. pp. 16-18.
- Carey, A.B., M.M. Hardt, S.P. Horton, and B.L. Biswell
1991. Spring bird communities in the Oregon Coast Range. In Wildlife and vegetation of unmanaged Douglas-fir forests. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285, Pacific Northwest Research Station, Portland, Oregon. pp. 123-142.

- Chen, J., J. Franklin, and T. Spies
1990. Edge phenomena in old-growth Douglas-fir forests: microclimatic pattern. *Bulletin of the Ecological Society of America*. Supplement to Volume 71(2):117.
- Clayton, M. and Associates
1993. Western regional corridor study.
- Coleman Crocker-Bedford, D.
1990. Goshawk reproduction and forest management. *Wildlife Society Bulletin* 18:262-269.
- Corn, P.S. and R.B. Bury
1991. Small mammal communities in the Oregon Coast Range. In *Wildlife and vegetation of unmanaged Douglas-fir forests*. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285. Pacific Northwest Research Station, Portland, Oregon. pp. 241-254.
- 1991a. Terrestrial amphibian communities in the Oregon Coast Range. In *Wildlife and vegetation of unmanaged Douglas-fir forests*. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285. Pacific Northwest Research Station, Portland, Oregon. pp. 305-318.
- Crispin, V., R. House and D. Roberts
Changes in instream habitat, large woody debris and coho salmon habitat after restructuring an coastal Oregon stream. *North American Journal of Fisheries Management*. In press.
- Crow, T.R.
1990. Old growth and biological diversity: a basis for sustainable forestry. In *Old Growth Forests*. Edited and compiled by Faculty of Forestry, University of Toronto, Canadian Scholar's Press Inc., Toronto, Canada. pp. 49-62.
- Dale, V.H. and J.F. Franklin.
1989. Potential effects of climate change on stand development in the Pacific Northwest. *Canadian Journal Forest Resources* 19(12).
- Davis, S.
1990. Effectiveness of a winged subsoiler in ameliorating a compacted clayey forest soil. In *Western Journal of Applied Forestry*, Volume 5, No. 4. pp. 138-139.
- Dawson, W.R., J.D. Ligon, J.R. Murphy, J.P. Myers, D. Simberloff, and J. Berner
1986. Report of the advisory panel on the spotted owl. Audubon Conservation Report 7. National Audubon Society, New York, New York.
- Dyrness, C.T.
1965. Soil surface condition following tractor and high-lead logging in the Oregon Cascades. *Journal of Forestry* 63:272-275.
- Dyrness, C.T.
1967. Soil surface conditions following skyline logging. U.S. Department of Agriculture, Forest Service, Research Note 55, Pacific Northwest Experiment Station, Portland, Oregon.
- Evenden, F.G., Jr.
1948. Distribution of the turtles of western Oregon. *Herpetologica* 4(6):201-204.
- Falk D. and K. Holsinger
1991. Genetics and conservation of rare plants.
- Forest Ecosystem Management Assessment Team
1993. Forest ecosystem management: an ecological, economic, and social assessment. Portland, Oregon.
- Forsman, E.D.
1976. A preliminary investigation of the spotted owl in Oregon. M.S. thesis. Oregon State University, Corvallis, Oregon.
- Forsman, E.D.
1980. Habitat utilization by spotted owls in the west-central Cascades of Oregon. Ph.D. thesis. Oregon State University, Corvallis, Oregon.
- Forsman, E.D., C.R. Bruce, M.A. Walter, and E.C. Meslow
1987. A current assessment of the spotted owl population in Oregon. The Murrelet.
- Forsman, E.D. and E.C. Meslow
1985. Old-growth forest retention for spotted owls. How much do they need? In R.J. Gutierrez and A.B. Carey (technical editors). *Ecology and management of the spotted owl in the Pacific Northwest*. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-185, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 58-59.

- Forsman, E.D. and E.C. Meslow
1986. The spotted owl. In A.S. Eno, R.L. DiSilvestro, and W.S. Chandler. Audubon Wildlife Report. National Audubon Society, New York, New York. pp. 743-761.
- Forsman, E.D., E.C. Meslow, and M.J. Strub
1977. Spotted owl abundance in young versus old-growth forests, Oregon. Wildlife Society Bulletin 5:43-47.
1986. Spotted owls in young forests - additional surveys in the northern Coast Range of Oregon. Unpublished manuscript. U.S. Department of the Interior, BLM, Eugene District Office, Eugene, Oregon.
- Forsman, E.D., E.C. Meslow, and H.M. Wight
1984. Distribution and biology of the spotted owl in Oregon. Wildlife Monograph No. 87.
- Franklin, J.F.
1988. Structural and functional diversity in temperate forests. In biodiversity. Ed. E.O. Wilson. Washington D.C. National Academic Press.
- Franklin, J.F. and C.T. Dyrness
1973. Natural vegetation of Oregon and Washington. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-8, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.
- Franklin, J.F., K. Cromack Jr., W. Denison, A. McKee, C. Maser, J. Sedall, F. Swanson, and G. Juday
1981. Ecological characteristics of old-growth Douglas-fir forests. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-118, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 48 pp.
- Franklin, J.F. and T.A. Spies
1984. Characteristics of old-growth Douglas-fir forests. In New forests for a changing world. Society of American Foresters. pp. 328-334.
- French, D.M.
1991. Population ecology, habitat requirements and conservation of neotropical migratory birds. U.S. Department of Agriculture, Forest Service, General Technical Report RM-205. 26 pp.
- Froehlich, H.A., D.E. Aulerich, and R. Curtis
1981. Designing skid trail systems to reduce soil impacts from tractive logging machines. Research Paper 44, Oregon State University, Corvallis, Oregon. 15 pp.
- Furniss, R.L. and V.M. Carolin
1977. Western forest insects. Publication No. 1339. U.S. Department of Agriculture, Forest Service.
- Garcia, E.R.
1979. A survey of the spotted owl in Washington. In P.O. Schaeffer and S.M. Ehlers (editors) Owls of the west, their ecology and conservation. National Audubon Society, Western Education Center, Tiburon, California.
- Garland, J.J.
1982. Designated skid trails to minimize soil compaction. Paper presented at U.S. Department of the Interior, BLM workshop, October 7, 1982.
- Gilbert, F.F. and R. Allwine
1991. Terrestrial amphibian communities in the Oregon Cascade Range. In Wildlife and vegetation of unmanaged Douglas-fir forests. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285, Pacific Northwest Research Station, Portland, Oregon. pp. 319-324.
- Green, D.M. and R.W. Campbell
1984. The amphibians of British Columbia. Handbook No. 45, VIII. British Columbia Provincial Museum, Victoria, British Columbia. 102 pp.
- Gould, G.I., Jr.
1977. Distribution of the spotted owl in California. Western Birds 8:131-146.
- Gutierrez, R.J.
1985. An overview of recent research on the spotted owl. In R.J. Gutierrez and A.B. Carey (technical editors). Ecology and management of the spotted owl in the Pacific Northwest. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-185, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 39-49.
- Hall, P.
1984. Characterization of nesting habitat of goshawks (*Accipiter gentilis*) in northwestern California. M.S. thesis. Humboldt State University, Arcata, California.
- Halpern, C.B.
1987. Twenty-one years of secondary succession in Pseudotsuga forests of the western Cascade Range, Oregon. Ph.D. thesis. Oregon State University, Corvallis, Oregon.

- Harcombe, D.W.
1976. Oregon cougar study. Oregon Department of Fish and Wildlife. Portland, Oregon.
- Harmon, M.E., W.K. Ferrell, and J.F. Franklin
1990. Effects on carbon storage of conversion of old-growth forests to young forests. *Science* 247:4943.
- Harris, L.D.
1984. The fragmented forest. University of Chicago Press, Chicago, Illinois. 211 pp.
- Harvey, A.E., N.J. Larsen, and M.F. Jurgensen
1979. Comparative distribution of ectomycorrhizae in soils of three western Montana forest habitat types. *Forest Science* 25:350-360.
- Hays, M.P. and M.R. Jennings
1986. Decline of ranid frog species in western North America: are bullfrogs (*Rana catesbeiana*) responsible? *Journal of Herpetology* 20(4):490-509.
- Heifetz, J., M.L. Murphy, and K.V. Koski
1986. Effects of logging on winter habitat of juvenile salmonids in Alaskan streams. *North American Journal of Fisheries Management* 6:52-58.
- Hitchcock, C.L. and A. Cronquist
1973. Flora of the Pacific Northwest. University of Washington Press.
- House, R.A. and P.L. Boehne
1987. The effect of stream cleaning on salmonid habitat and populations in a coastal Oregon stream. *Western Journal of Applied Forestry* 3:84-87.
- House, R.A. and V. Crispin
1990. Economic analyses of the value of large woody debris as salmonid habitat in coastal Oregon streams. U.S. Department of the Interior, BLM, Oregon State Office. T/N-OR-7. 11 pp.
- House, R.A., V. Crispin and R. Monthey
1989. Evaluation of stream rehabilitation projects. Salem District (1981-88). U.S. Department of the Interior, BLM, Oregon State Office. T/N OR-6. 50 pp.
- House, R.A., V. Crispin, and J.M. Suther
1991. Habitat and channel changes after rehabilitation of two coastal Oregon streams. *American Fisheries Society Symposium* 10:150-159.
- Hunter, M.L., Jr.
1990. Wildlife, forests and forestry: principles of managing forests for biological diversity. New Jersey. Prentice Hall. 370 pp.
- Jackman, S.M. and J.M. Scott.
1975. Literature review of twenty-three selected forest birds of the Pacific Northwest. Unpublished report. 382 pp.
- Jones and Stokes Associates, Inc.
1980. Wildlife species accounts. Life histories and habitat relationships of species commonly found in old growth conifer forests of western Oregon, western Washington and northwestern California. Unpublished report for the Northwest Timber Association, Eugene, Oregon, and Western Forest Industries Association, Portland, Oregon. 394 pp.
- Joyce, L.A., M.A. Fosberg, and J.M. Comanoar
1990. Climate change and America's forests. U.S. Department of Agriculture, Forest Service, General Technical Report RM-187.
- Keister, G.P.
1981. Characteristics of winter roosts and populations of bald eagles in the Klamath Basin. M.S. thesis. Oregon State University, Corvallis, Oregon.
- Kimmins, J.P. and K.A. Scoullar
1990. FORCYTE 11.4. - a user's manual. Draft contractor's report to forestry Canada, northwest region, Edmonton, Alberta.
- Koch, P.
1991. Wood vs. non-wood materials in residential construction: some energy related international implications. CINTRAFOR, University of Washington, Seattle, Washington.
- Lande, R.
1985. Report on the demography and survival of the northern spotted owl. Unpublished manuscript. Department of Biology, University of Chicago, Chicago, Illinois.
- Lavender, D.P.
1989. Predicted global climate change and the chilling requirement of conifers. Paper presented at Western Forests Conference, Sacramento, California.

- Ledig, F. and D.M. Smith
1981. The influence of silvicultural practice on genetic improvement: height growth weevil resistance in eastern white pine. *Silvae Genetica*, 30: 30-36.
- Lee, R.G., P. Sommers, H. Birss, C. Nasser, and J. Zientek
1991. Social impacts of alternative timber harvest reductions on federal lands in O&C counties. Final report for the association of O&C counties. College of Forest Resources, Northwest Policy Center, University of Washington, Seattle, Washington.
- Lehmkuhl, J. and L. Ruggiero
1991. Forest fragmentation in the Pacific Northwest and its potential effects on wildlife. In *Wildlife and vegetation of unmanaged Douglas-fir forests*. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285. Pacific Northwest Research Station, Portland, Oregon. pp. 35-46.
- Lehmkuhl, J., L. Ruggiero and P. Hall
1991. Landscape-scale patterns of forest fragmentation and wildlife richness and abundance in the southwest Washington Cascade Range. In *Wildlife and vegetation of unmanaged Douglas-fir forests*. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-GTR-285, Pacific Northwest Research Station, Portland, Oregon. pp. 425-442.
- Lienkaemper, G.W. and F.J. Swanson
1987. Dynamics of large woody debris in streams in old growth Douglas-fir forests. *Canadian Journal Forest Resources* 17:150-156.
- Lippke, B.R.
1991. Meeting the need for environmental protection while satisfying the global demand for wood and other raw materials: a North American and global trade perspective. Proceedings of an international conference by the Forest Products Research Society. Vancouver, British Columbia.
- Logan, W., E.R. Brown, D. Longrie, and R.A. Corthell
1985. Edges. In E.R. Brown (editor). *Management of wildlife and fish habitats in forests of western Oregon and Washington*. U.S. Department of Agriculture, Forest Service, Publication No. R6-F&WL-192-1985. Pacific Northwest Region, Portland, Oregon. pp. 115-127.
- Long, J.N.
1977. Trends in plant species diversity associated with development in a series of *Pseudotsuga menziesii* / *Gaultheria shallon* stands. *Northwest Science* 51(2):119-130.
- Marcot, B.
1991. Snag recruitment simulator. Documentation of installation routine. U.S. Department of Agriculture, Forest Service. Portland, Oregon.
- Marcot, B.G. and J. Gardetto
1980. Status of the spotted owl in Six Rivers National Forest, California. *Western Birds* 11(2):79-87.
- Marshall, D.B.
1992. Sensitive vertebrates of Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon.
- Maser, C., J.M. Trappe, and R.A. Nussbaum
1978. Fungal-small mammal interrelationships with emphasis on Oregon coniferous forests. *Ecology* 59(4):799-809.
- Maser, C., B.R. Mate, J.F. Franklin, and C.T. Dyrness
1981. Natural history of Oregon coast mammals. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-133. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 496 pp.
- Maser, C. and J.M. Trappe (editors)
1984. The seen and unseen world of the fallen tree. U.S. Department of Agriculture, Forest Service, General Technical Report PNW-164. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.
- Maser, C., R.F. Tarrant, J.M. Trappe, and J.F. Franklin (technical editors)
1988. From the forest to the sea: a story of fallen trees. U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM, General Technical Report PNW-GTR-229. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.
- McArdle, R.E., W.H. Meyer, and D. Bruce
1961. The yield of Douglas-fir in the Pacific Northwest. U.S. Department of Agriculture Technical Bulletin No. 201.

- McKelvey, K.
1992. A spatially explicit life history simulator for the northern spotted owl. Appendix 4-1 in Salem District Draft Resource Management Plan and Environmental Impact Statement. U.S. Department of Interior, BLM, Salem District, Salem, Oregon.
- McNabb, D.H. and H.A. Froehlich
1983. Minimizing soil compacting in Pacific Northwest forests. In E.L. Stone (editor). Forest soils and treatment impacts. Proceedings of Sixth North American Forest Soils Conference, University of Tennessee Conferences. pp. 159-192.
- Mellen, T.K.
1987. Home range and habitat use of pileated woodpeckers, western Oregon. M.S. thesis. Oregon State University, Corvallis, Oregon. 96 pp.
- Meslow, E.C. and G.S. Miller
1986. Dispersal of juvenile northern spotted owls in the Pacific Northwest Douglas-fir region. Progress Report, Oregon Coop. Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.
- Meyer, J.S., L.L. Irwin, and M.S. Boyce
1992. Influence of habitat fragmentation on spotted owl site location, site occupancy, and reproductive status in western Oregon. Progress Report.
- Mill City Economic Development Committee
1991. Mill City strategic plan. Mill City, Oregon.
- Millar, C.I., R.D. Westfall, and D. Delaney
1990. Effects of timber management on genetic diversity in Jeffrey pine. Project Summary, Institute of Forest Genetics, U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.
- Monthey, R.W.
1983. Responses of birds to timber harvesting along meadow edges in northwestern Oregon. Northwest Science 57(4):283-290.
- Murphy, M.L. and K.V. Koski
1989. Input and depletion of woody debris in Alaska streams and implications for streamside management. North American Journal of Fisheries Management 9:427-436.
- National Academy of Sciences
1991. Policy implications of greenhouse warming.
- Nehlsen, W., J.E. Williams, and J.A. Lichatowich
1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. American Fisheries Society, Fisheries 16 (2):4-21.
- Nelson, S.K.
1988. Habitat use and densities of cavity nesting birds in the Oregon Coast Range. M.S. thesis. Oregon State University, Corvallis, Oregon. 157 pp.
- Nelson, S.K.
1993. Inland habitat use and status of the marbled murrelet. Oregon Coop. Wildlife Research Unit, Oregon State University, Corvallis, Oregon. Abstract presented at 1993 Annual Meeting and Symposium of The Oregon Chapter of The Wildlife Society.
- Neitro, W.A., R.W. Mannan, D. Taylor, V.W. Binkley, B.G. Marcot, F.F. Wagner, and S.P. Cline
1985. Snags. In E.R. Brown (ed.). Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Department of Agriculture, Forest Service, Publication No. R6-F&WL-192-1985, Pacific Northwest Region, Portland, Oregon. pp. 129-169.
- Niem, A.R., and W.A. Niem
1985. Oil and gas investigation of the Astoria Basin, Clatsop and northernmost Tillamook Counties, Northwest Oregon. OGI-14. 8 pp.
- Noble, W.O., E.C. Meslow, and M. Pope
1990. Denning habits of black bears in the Central Coast Range of Oregon. Oregon Coop. Wildlife Research Unit, Oregon State University, Corvallis, Oregon.
- Northwest Power Planning Council
1988. Northwest conservation and electric power plan.
- Nussbaum, R.A., E.D. Brodie, Jr., and R.M. Storm
1983. Amphibians and reptiles of the Pacific Northwest. University Press of Idaho. 332 pp.
- Oldfield, M.
1984. The value of conserving genetic resources.

Old-Growth Definition Task Group

1986. Interim definitions for old-growth Douglas-fir and mixed-conifer forests in the Pacific Northwest and California. U.S. Department of Agriculture, Forest Service, Research Note PNW-447. Pacific Northwest Research Station, Portland, Oregon. 7 pp.

Oregon Department of Environmental Quality

1986. State implementation plan. Portland, Oregon.

1988. Water quality status report (305b report).

1988a. Oregon statewide assessment of nonpoint sources of water pollution (319 report).

1990. Water quality status report (305b report).

1992. Water quality status report (305b report).

Oregon Department of Fish and Wildlife

1987. Oregon cougar management plan. Portland, Oregon.

1990. Plan review criteria to conserve fish and wildlife resources on Bureau of Land Management forest lands in western Oregon. Portland, Oregon.

1991. Oregon salmon and steelhead catch data, 1978-1990.

Oregon Department of Forestry

1977-1993. Oregon smoke management annual reports. Salem, Oregon.

1986. Oregon smoke management plan. Salem, Oregon.

various years. Oregon timber harvest report. Salem, Oregon.

1990. Forestry program for Oregon.

1991. A report on prescribed burning in Oregon, 1990. Prepared for the Joint Interim Environment, Energy, and Hazardous Material Committee of the Oregon Legislature.

Oregon Division of State Lands

1983. Management of beds and banks of navigable water bodies. ORS 274.005-274.590. Salem, Oregon.

Oregon Economic Development Department

1988. Regional economic development strategies, executive summaries.

1993. Oregon timber response program, updated community list.

Oregon Employment Division

1984-1990. Unemployment rates in counties and Metropolitan Statistical Areas.

1991. Linn-Benton labor trends.

1992. Business and employment outlook. Vol. 1. Salem, Oregon.

Oregon Legislature, Joint Legislative Committee on Land Use

1991. Dependent communities desktop analysis. Forest Products Committee Staff.

Oregon Natural Heritage Program

1993. Rare, threatened and endangered plants and animals of Oregon. Portland, Oregon.

Oregon Parks and Recreation Department

1988. 1988-1993 statewide comprehensive outdoor recreation plan.

Oregon Progress Board

1992. Oregon benchmarks, report to the 1993 legislature. Salem, Oregon.

Oregon Water Resources Commission

1990. Oregon water management program.

Pacific Fishery Management Council

1992. Review of 1991 ocean salmon fisheries.

Pacific Power Economic Development Department

1991. Sweet Home economic development group
1992-93 action plan.

- Pacific Seabird Group
1993. White paper on the status of marbled murrelets.
- Palmer, R., R. Vanbianchi, L. Scofield, and S. Nugent.
1987. Ecology and distribution of *Poa maritima* (Hitch.) in northwestern Oregon. Holton Assoc., Berkeley, California.
- Parke, J., R.G. Linderman, and J.M. Trappe
1983. Effects of forest litter on mycorrhiza development and growth of Douglas-fir and western redcedar seedlings. Canadian Journal Forest Resources.
- Patton, C.
1976. Atlas of Oregon. University of Oregon Books.
- Perez-Garcia, J.M.
1991. An assessment of the impacts of recent environmental and trade restrictions on timber harvest and exports. CINTRAFOR, University of Washington, Seattle, Washington.
- Perry, D. A. and J. Maghembe
1989. Ecosystem concepts and current trends in forest management: time for reappraisal. Forest Ecology and Management 26:123-140.
- Phillips, R.
1994. The President's forest plan: Oregon's timber industry employment can never be the same. Oregon Labor Trends, State of Oregon Employment Department.
- Polunin, N.
1960. Introduction to plant geography. McGraw-Hill: New York.
- Portland State University, Center for Population Research and Census
1991-1993. Official population estimates Oregon cities and counties. Portland, Oregon.
- Postovit, H.R.
1977. A survey of the spotted owl in northwest Washington. Unpublished manuscript. National Forest Products Assoc., Washington, D.C.
- Power, W.E.
1987. Timber production capability classification technical guide. U.S. Department of the Interior, BLM, Salem District Office, Salem, Oregon.
- Power, H.W.
1989. Birds of song and lore. What happened to the bluebird? Birders World, August 1989. pp. 14-18.
- Powers, R.F.
1989. Maintaining long-term forest productivity in the Pacific Northwest: defining the issues. In D.A. Perry, et al. (eds.). Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems. pp. 3-16.
- Raphael, M.G. and R.H. Barrett
1984. Diversity and abundance of wildlife in late-successional Douglas-fir forests. In New Forests for a Changing World, Proceedings of 1983 Society of American Foresters National Convention. Portland, Oregon.
- Raphael, M.G., C.A. Taylor, and R.H. Barrett
1986. Smoked aluminum track stations recorded flying squirrel occurrence. U.S. Department of Agriculture, Forest Service, Research Note PSW-384. Pacific Southwest Forest and Range Experiment Station, Arcata, California.
- Regens, J.L., F.W. Cabbage, and D.G. Hodges
1989. Greenhouse gases, climate change and U.S. forest markets. Environment 31:4.
- Reid, J., A. Carey, and S. Horton
1987. Home range and habitat use of the spotted owl in the Oregon Coast Range. Proceedings Raptor Research Foundation. In press.
- Reynolds, R.T.
1983. Management of western coniferous forest habitat for nesting accipiter hawks. U.S. Department of Agriculture, Forest Service, General Technical Report RM-102, Rocky Mountain Forest and Range Experiment Station. 7 pp.
- Reynolds, R.T., E.C. Meslow, and H.M. Wight
1982. Nesting habitat of coexisting accipiter in Oregon. Journal of Wildlife Management 46: 124-138.
- Richardson, C.W.
1993. An analysis of the socioeconomic effects of Bureau of Land Management resource management plan in western Oregon. Report prepared for U.S. Department of the Interior, BLM.
- Ruth, R.H.
1967. Silvicultural effects of skyline crane and high-lead yarding. Journal of Forestry 65:251-255.

- Sachs, D.
1988. Calibration of FORCYTE-11 for western Oregon Douglas-fir. Project Report to U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM. Department of Forest Science, Oregon State University, Corvallis, Oregon.
- Sandberg, D.V., J.L. Peterson, and R.D. Ottmar.
1985. Daily slash burn emissions - inventory design - year 1. Final Report. IAG EPA 83-291. Seattle, Washington: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Fire and Air Research Project; U.S. Environmental Protection Agency, Office of Air Program, Region X. 64 pp.
- Schaek, R.
1991. Personal communication to BLM Oregon State Office economist.
- Schafer, C.L.
1990. Nature reserves, island theory and conservation practice. Smithsonian Institution Press: Washington D.C.
- Schallau, C.H. and A. Goetzl
1992. Effects of constraining U.S. timber supplies: repercussions are national and global. *Journal of Forestry*, July. pp. 22-27.
- Schlosser, W.E., K.A. Blatner, and B. Zamora
1992. Assessment of the potential for managing forest lands for special forest products production. Department of Natural Resource Sciences, Washington State University, Pullman, Washington.
- Schneider, S.H.
1989. The changing climate. *Scientific American* 261:3.
- Schneider, S.H.
1991. Three reports of the intergovernmental panel on climate change. *Scientific American* 261:3.
- Schoonmaker, P. and A. McKee
1988. Species composition and diversity during secondary succession of coniferous forests in the western Cascade Mountains of Oregon. *Forest Science* 34(4):960-979.
- Schreiber, B.
1987. Diurnal bird use of snags on clearcuts in central coastal Oregon. M.S. thesis. Oregon State University, Corvallis, Oregon. 63 pp.
- Sedell, J.R., P.A. Bisson, F.J. Swanson, and S.V. Gregory
1988. What we know about large trees that fall into streams and rivers. In C. Maser, R.F. Trappe, and J.M. Franklin (eds.). *From the forest to the sea: a story of fallen trees*. U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, BLM, General Technical Report PNW-GTR-229. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. pp. 47-82.
- Seidel, K.
1993. Demographic and economic characteristics of Oregon's timber-dependent communities. *Oregon Profiles*, No. 2, June 1993. Oregon State University Extension Service, Corvallis, Oregon.
- Sessions, J. (ed.)
1990. Timber for Oregon's tomorrow - 1989 update. Oregon State University, Corvallis, Oregon.
- Sharp, B.E.
1992. Neotropical migrants on national forests in the Pacific Northwest. Unpublished manuscript prepared for U.S. Department of Agriculture, Forest Service, Region 6.
- Sisco, C. and R.J. Gutierrez
1984. Winter ecology of radio-tagged spotted owls on Six Rivers National Forest, Humboldt County, California. Unpublished manuscript. U.S. Department of Agriculture, Forest Service, Six Rivers National Forest, Eureka, California.
- Smith, R.L.
1966. Ecology and field biology. New York: Harper and Row. 686 pp.
- Society of American Foresters
1989. Report of the society of american foresters national task force on community stability. Society of American Foresters Resource Policy Series, Bethesda, Maryland.
- Solis, D.M. and R.J. Gutierrez
1982. Spotted owl habitat use on Six Rivers National Forest, Humboldt County, California. Unpublished manuscript. U.S. Department of Agriculture, Forest Service, Six Rivers National Forest, Eureka, California.
- Solis, D.M.
1983. Summer habitat ecology of spotted owls in northwestern California. M.S. thesis. Humboldt State University, Arcata, California.

- Spies, T.A., J.F. Franklin, and M. Klopsch
1990. Canopy gaps in Douglas-fir forests of the Cascade mountains. *Canadian Journal Forest Resources* 20:639-648.
- St. John, A.D.
1987. The herpetology of the Willamette Valley, Oregon. Oregon Department of Fish and Wildlife Nongame Program, Technical Report 86-1-02. 79 pp.
- Stalmaster, M.V.
1981. Ecological energetics and foraging behavior of wintering bald eagles. Ph.D. dissertation. Utah State University, Logan, Utah.
- Steinbrenner, E.C.
1955. The effect of repeated tractor trips on the physical properties of forest soils. *Northwest Science* 29: pp. 155-159.
- Stewart, G.H.
1986. Population dynamics of a montane conifer forest, western Cascade Range, Oregon. U.S.A. *Ecology* 67(2).
- Teensma, P., J. Rienstra, and M. Yelzer
1991. Preliminary reconstruction and analysis of change in forest stand age classes of the Oregon Coast Range from 1850 to 1940. Technical Note T/N OR-9. U.S. Department of the Interior, BLM, Oregon State Office, Portland, Oregon.
- Thomas, J.W. (ed.)
1979. Wildlife habitats in managed forests. The Blue Mountains of Oregon and Washington. Agriculture Handbook No. 553. U.S. Department of Agriculture, Forest Service. 512 pp.
- Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner
1990. A conservation strategy for the northern spotted owl. Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl. 458 pp.
- Trexler, M.C.
1991. Minding the carbon store: weighing U.S. forestry strategies to slow global warming. World Resources Institute.
- U.S. Department of Agriculture, Forest Service
1992. Forest landscape analysis and design. Pacific Northwest Region. Portland, Oregon.
- 1992a. Management direction on northern spotted owls. Environmental impact statement.
1993. A first approximation of ecosystem health: national forest system lands, Pacific Northwest Region. Regional Office, Portland, Oregon.
- 1993a. Pacific yew environmental impact statement.
- U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management.
1994. Final supplemental environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Portland, Oregon.
- 1994a. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. Portland, Oregon.
- U.S. Department of Agriculture, Pacific Northwest Research Station
1992. Timber supply analysis for Bureau of Land Management planning.
- U.S. Department of Commerce, Bureau of Economic Analysis
1993. Personal income and employment tables, 1969-1991. (CD-ROM format). Regional Economic Information System.
- U.S. Department of the Interior and U.S. Department of Agriculture
1982. Federal register - national wild and scenic rivers system, final revised guidelines for eligibility, classification and management of river areas. pp. 39454-39461.
- U.S. Department of the Interior, Bureau of Land Management, Salem District, Oregon
1983. Eastside Salem timber management plan record of decision. Salem District Office, Salem, Oregon.
- 1983a. Management framework plan for the eastside Salem District planning area. Salem District Office, Salem, Oregon.

-
- 1983b. Management framework plan for the westside Salem District planning area. Salem District Office, Salem, Oregon.
-
- 1983c. Westside Salem District timber management plan record of decision. Salem District Office, Salem, Oregon.
-
- 1984-1992. Annual monitoring reports. Salem District Office, Salem, Oregon.
-
1987. Timber production capability classification technical guide. Salem District Office, Salem, Oregon.
-
- 1987a. Table Rock Wilderness management plan. Salem District Office, Salem, Oregon.
-
1991. Analysis of the management situation. Unpublished report. Salem District Office, Salem, Oregon.
-
- 1991a. Summary of the analysis of the management situation. Salem District Office, Salem, Oregon.
-
1993. Hazardous materials contingency plan. Salem District Office, Salem, Oregon.
-
- U.S. Department of the Interior, Bureau of Land Management, Oregon State Office
1985. Northwest area noxious weed control program final environmental impact statement. Oregon State Office, Portland, Oregon.
-
- 1985a. A five-year comprehensive anadromous fish habitat enhancement plan for Oregon coastal rivers. Oregon State Office, Portland, Oregon.
-
1986. Visual resource inventory handbook H-8410-1, Illustrations 1 and 2.
-
1987. Supplement to Northwest area noxious weed control program final environmental impact statement. Oregon State Office, Portland, Oregon.
-
- 1987a. An updated tree improvement plan for western Oregon, 1965-1987. Oregon State Office, Portland, Oregon.
-
- 1988a. Oregon timber production capability classification handbook 5251. Oregon State Office, Portland, Oregon.
-
1989. Western Oregon program-management of competing vegetation environmental impact statement. Oregon State Office, Portland, Oregon.
-
- 1989a. Public lands recreation - a management strategy for special recreation management areas in Oregon and Washington, Volumes 1-2 and supplement. Oregon State Office, Portland, Oregon.
-
- 1989b. BLMPACT software and reference manual. OR-952-CT9-2019. Prepared by ECO Northwest. Oregon State Office, Portland, Oregon.
-
- 1989c. Per unit expenditures and fiscal impacts report. OR-952-CT9-2019. Prepared by ECO Northwest. Oregon State Office, Portland, Oregon.
-
1990. Manual supplement H-5420-1. Timber production capability classification. Oregon State Office, Portland, Oregon.
-
- 1990a. Oregon wilderness environmental impact statement. Oregon State Office, Portland, Oregon.
-
1991. Final state director guidance. Oregon State Office, Portland, Oregon.
-
1992. Western Oregon program-management of competing vegetation record of decision. Oregon State Office, Portland, Oregon.
-
- various years. BLM Facts. Oregon State Office, Portland, Oregon.

- U.S. Department of the Interior, Bureau of Land Management, Washington Office
 1989. Fish and wildlife 2000: a plan for the future. Washington Office, Washington, D.C.
-
- 1989a. Recreation 2000: a strategic plan. Washington Office, Washington, D.C.
-
1990. Adventures in the Past. Bureau of Land Management, Washington Office, Washington D.C.
-
1991. Riparian-wetlands initiative for the 1990s. Washington Office, Washington, D.C.
- U.S. Department of the Interior, Fish and Wildlife Service
 1982. Pacific coast recovery plan for the American peregrine falcon. Prepared by the Pacific Coast American Peregrine Falcon Recovery Team.
-
1985. Sensitive bird species. Region One. Unpublished report.
-
1986. Pacific bald eagle recovery plan. Portland, Oregon.
-
1992. Recovery plan for the northern spotted owl; draft. Portland, Oregon.
-
- 1992a. [unpublished] Final draft recovery plan for the northern spotted owl. Portland, Oregon.
- U.S. Department of the Interior, National Park Service
 1982. Nationwide rivers inventory. Washington, D.C.
- U.S. Federal Highway Administration
 1989. Highway functional classification concepts, criteria and procedures. Federal Highway Administration manual.
- Vale, T.R.
 1981. Tree invasion of montane meadows in Oregon. The American Midland Naturalist 105(1).
- Vanderheyden, J.
 1980. Chronological variation in soil density and vegetative cover of compacted skid trails in clearcuts of the western Oregon Cascades. M.S. thesis. Oregon State University, Corvallis, Oregon.
- Van Sickle, J. and S.V. Gregory
 1990. Modeling inputs of large woody debris to streams from falling trees. Canadian Journal Forest Resources 20:1593-1601.
- Vincent, R.E.
 1986. An evaluation of spotted owl inventory and management on U.S. Forest Service lands in Region 6. Report prepared for Northwest Timber Association and Western Forestry Industries Association.
- Washington Department of Wildlife
 1989. Working implementation plan for bald eagle recovery in Oregon and Washington. The Bald Eagle Working Team for Oregon and Washington.
- Wert, S. and B.R. Thomas
 1981. Effects of skidroads on diameter, height and volume growth in Douglas-fir. Soil Science Society of American Journal 45(3):629-632.
- Whitaker, J.O., Jr., C. Maser, R.M. Storm, and J.J. Beatty
 1986. Food habits of clouded salamanders (*Aneides ferreus*) in Curry County, Oregon. (*Amphibia:Caudata:Plethodontidae*) Great Basin Naturalist 46(2):228-240.
- Wilson-Jacobs, R. and E.C. Meslow
 1984. Distribution, abundance, and nesting characteristics of snowy plovers on the Oregon coast. Northwest Science 58:40-48.
- Wilson, E.O.
 1988. The current state of biological diversity. In E.O. Wilson (ed.). Biodiversity. National Academic Press, Washington, D.C.
- Wisdom, M.J., L.R. Bright, C.G. Carey, W.W. Hines, R.J. Pedersen, D.A. Smithley, J.W. Thomas, and G.W. Witmer
 1986. A model to evaluate elk habitat in western Oregon. U.S. Department of Agriculture, Forest Service, Publication No. R6-F&WL-216, Pacific Northwest Region, Portland, Oregon. 36 pp.

Witt, J.

1990. Productivity and management of osprey along the Umpqua River, Oregon. *Northwestern Naturalist* 71:14-19.

Witt, J.

1991. Personal communication to Roger Monthey.

Woolington, M.C.

1985. A preliminary investigation of the effect of recreational use on nesting snowy plovers at Sutton and Siltcoos Beach areas. Oregon Department of Fish and Wildlife. On file at U.S. Department of the Interior, BLM, Coos Bay District Office, Coos Bay, Oregon. pp. 26.

List of Preparers

While individuals have primary responsibility for preparing sections of a proposed resource management plan, the document is an interdisciplinary team effort. Internal review of the document occurs throughout preparation. BLM resource specialists review the analysis and supply information. Contributions by individual preparers may be subject to revision by other BLM specialists and by management during the internal review process.

Name	Primary Responsibility	Discipline	Related Federal Government Experience
Scott S. Abdon	Recreation, Wild and Scenic Rivers, Wilderness	Outdoor Recreation and Wilderness Planning	20 years BLM (outdoor recreation planner)
Bruce H. Ahrendt	Soils, Water Resources, Geographic Information System	Forest Soils	4 years BLM (forester), 12 years BLM (soil scientist)
H. Singh Ahuja	Energy and Minerals	Geology, Energy and Minerals Evaluation	3 years U.S. Geological Survey (hydrologist), 11 years BLM (geologist)
Dale E. Bays	Timber Supply Analyst	Forest Management	23 years BLM (forester and economist)
Scott Brayton	Writer/Editor, Public Involvement	Communications	4 years BLM (writer/editor), 12 years BLM (public affairs)
Steve Brownfield	Forest Inventory, Probable Sale Quantity Modeling, Ten-year Timber Management Scenario	Forestry	3 years Forest Service (forester), 14 years BLM (forester)
Chris Cadwell	Natural Resource Data Base	Forestry	13 years BLM (natural resource data base specialist)
Debra Carey	Cartography, Document Typesetting, Editing	Civil Engineering Drafting, Desktop Publishing	5 years Forest Service (engineering drafting), 17 years BLM (civil engineering technician)
Mike Dietrich	Fire Management, Air Quality	Fire Management	4 years North Dakota Parks and Recreation (park management), 15 years BLM (fire and fuels, silviculture)
Duane Dippon	Automated Resource Data	Geographic Information System	5 years BLM (forester)
Belle Foti	Public Input Analysis, Monitoring, Biological Diversity	Environmental Protection	6 years BLM (forester), 4 years BLM (environmental protection specialist)
Phil Hamilton	Planning Process Coordinator	Planning	37 years BLM (forester), retired
Robert House	Fish and Riparian Zones	Fishery Biologist	7 years U.S. Fish and Wildlife Service (fishery biologist), 16 years BLM (fishery biologist)

List of Preparers (continued)

Name	Primary Responsibility	Discipline	Related Federal Government Experience
Leland J. Johnson	Transportation	Engineering	31 years BLM (engineer)
Donald A. Kahle	Forest Inventory, Probable Sale Quantity Modeling	Forest Management	33 years BLM (forester), retired
Mark Kinslow	Recreation, Special Areas, Trails, Wild and Scenic Rivers, Geographic Information System	Outdoor Recreation Planning	4 years BLM (cartographic technician, outdoor recreation planner)
Mark Koski	Automated Resource Data, Geographic Information System	Geography	16 years BLM (geographer)
Ray Mobley	Visual Resources	Landscape Architecture	17 years BLM (landscape architect, visual resources specialist)
Roger W. Monthey	Wildlife, Biological Diversity, Vegetation, Fish, Special Status Species, Riparian Zones	Wildlife Biology	1/2 year Forest Service and U.S. Fish and Wildlife Service (wildlife biologist), 15 years BLM (wildlife biologist)
Frances M. Philipek	Cultural Resources, Special Areas	Archaeology	6 years U.S. Forest Service (archaeologist), 11 years BLM (archaeologist)
Leslie Frewing-Runyon	Socioeconomics	Economics	5 years BLM (economist)
Robert D. Saunders, Jr.	Team leader, Rural Interface Areas, Energy and Minerals	Land Use Planning	27 years BLM (outdoor recreation planner, planning and environmental coordinator)
Warren A. Tausch	Timber	Forest Management, Silviculture	19 years BLM (forester)
Peter Teensma	Fire, Air Quality	Fire Management	2 years Forest Service (fire) 6 years BLM (fire)
Julie Thiel	Special Status Species - Plants	Botany	5 years BLM (botanist)

Principal Support Staff

Judy Akahoshi	Word processing
Art Arroyo	Lands
Wayne Barney	Ten-year timber management scenario
Walt Gilde	Trim-Plus working group
Randy Gould	Ten-year timber management scenario
Rebecca Gravenmier	Geographic Information System coordination and development
Jim Hallberg	Public input analysis
Amy Haynes	Yield curves
Randall Herrin	Ten-year timber management scenario
Bob Hershey	Trim-Plus working group
Claire Hibler	Botany
Marty Hunter	Ten-year timber management scenario
Jim Iremonger	Trim-Plus working group
Bonnie Jakubos	Illustrations
Gregg Kirkpatrick	Ten-year timber management scenario
Bonnie Kovach	Public input analysis
Jeff Kovach	Trim-Plus working group
Nancy Leahy	Word processing
Wayne Logan	Wildlife
Jeffery S. Nighbert	Biological diversity team member, Hexagon analysis, Geographic Information System technical advisor
Chester Novak	Hydrology
Dr. David Perry	Biological diversity
Ed Sanvi	Ten-year timber management scenario
Larry Scofield	Vegetation, Special Status Species-Plants
Dan Schlottmann	Yield curves, Trim-Plus working group
Zane G. Smith	Biological diversity
Dale Snedaker	Trim-Plus working group

Principal Management Review

Elena Daly	Area Manager, Clackamas Resource Area
Paul Jeske	Area Manager, Santiam Resource Area
Mark Lawrence	Associate District Manager, Salem District
Van Manning	District Manager, Salem District
Jack Mears	Area Manager, Alsea Resource Area
Dick Prather	Area Manager, Yamhill Resource Area
Dana Shuford	Area Manager, Tillamook Resource Area

Index

Index - Chapter 1 Introduction

- access 5
- Aquatic Conservation Strategy 3
- coordination 5, 6
- critical habitat 2
- cumulative effects 5
- cultural resources 5
- energy 5, 6
- fish 2, 5
- herbicides 3, 5
- issues 4, 5
- land tenure 5
- land use allocations 5
- Late-Successional Reserves 3
- marbled murrelet 2
- minerals 1, 4, 5, 6
- monitoring 4, 5
- noxious plants/weed 3, 5
- old growth 1, 2, 4
- outstanding natural area 3
- planning criteria 4
- public involvement 4
- recovery plan 2
- recreation 2, 5, 6
- resource program 5
- Riparian Reserves 2, 3
- riparian zones 5
- roads 3, 5, 6
- rural interface areas 5
- special areas 5
- spotted owl 1, 2, 6
- threatened or endangered species 4, 5
- timber harvest 5
- Timber Production Capability Classification 5
- visual resources 5
- water 2
- water quality 3, 5
- wild and scenic rivers 3
- wilderness 3, 4, 5, 6
- wildlife 2, 4, 5
- withdrawals 5

Index - Chapter 2 Description of the Alternatives

- access 25, 29, 30, 59, 60, 63, 65-67, 69, 76, 82, 86, 87, 90-93, 97, 104
- adaptive management 16, 19, 31, 54, 112, 114, 117
- Adaptive Management Area 16, 27, 28, 31, 32, 41, 45, 59, 80, 114, 116, 117
- air quality 34, 78, 80, 83, 94, 113
- American Indians 49
- anadromous fish 24, 75, 87
- animals 44, 59, 60, 85, 86, 102, 104, 106
- Aquatic Conservation Strategy 16-18, 21, 22, 24-27, 34, 35, 37, 40, 51, 52, 55, 58, 61, 63, 64, 66, 68, 75-78, 111, 113
- area of critical environmental concern 46, 48, 87, 88, 95, 96, 109
- back country byway 57
- bald eagle 45, 86, 96, 97
- best management practices 22, 35, 41, 76, 80-82, 112
- biological diversity 16, 29, 37, 66, 99, 102, 103
- Connectivity/Diversity Blocks 16, 17, 32, 33, 38, 59, 61, 62, 64
- consistency 22, 35, 75, 81, 83, 86, 89, 90, 91, 93, 99, 101, 103, 104, 106, 108, 109, 112, 114, 115, 117
- consultation 1, 30, 42, 67, 69, 79, 86, 107, 108
- coordination 1, 20, 26, 31, 35, 40, 42, 43-46, 54, 61, 65, 79-81, 107, 108, 109, 114, 116
- cultural resources 49, 54, 67, 89, 90
- District-Designated Reserve 16, 27, 28, 68
- ecological health 17
- ecological principles 1, 16, 17
- energy 14, 26, 63, 65, 68, 73, 92, 96, 97, 99, 103, 105, 107
- environmental analysis 19, 42, 70, 80, 82, 90, 93, 109, 112, 113
- fertilization 6, 60, 85, 102
- fire/fuels management 19, 32, 34, 78, 79
- fish 8, 17, 18, 21, 24, 26, 27, 29, 31, 35, 37, 40-42, 45, 54, 66, 68, 75, 76, 81-83, 87, 91, 95, 96, 98, 102, 104, 106, 108, 112
- fragile area(s) / site(s) 35, 65, 80, 92, 97
- fuelwood 22, 29, 34, 61, 62
- General Forest Management Area 16, 32, 33, 54, 59, 60
- green trees 29, 38, 61, 86, 95, 104, 106
- hazardous materials 77, 94
- herbicides 26, 35, 54, 59, 84, 85, 93, 99, 101, 103, 107
- issues 37, 50, 57, 88, 111, 112, 116
- key watersheds 17, 18, 26, 35, 68, 76, 112, 117
- land tenure 66, 67, 90, 96-98, 103, 105, 107
- land use allocations 1, 16-21, 31, 34, 37, 40, 45, 46, 49, 51, 54, 56, 61, 70, 78, 95, 108
- Late-Successional Reserves 16, 19, 20, 27-32, 38, 41, 55, 61, 64, 68, 69, 75-77, 79, 113-115
- marbled murrelet 27, 28, 31, 45
- Matrix 16, 20, 32, 33, 37, 38, 41, 43, 45, 59
- minerals 25, 63, 64, 65, 82, 86, 87, 90, 92, 93, 96, 97, 99, 103, 105, 107, 115
- mitigation 26, 30, 34, 35, 44, 50, 52, 54, 89, 91, 102, 115
- monitoring 19, 25, 34, 52, 62, 64, 80, 84, 86, 90, 93, 108, 109, 111-117
- noxious plant/weed 77

Index - Chapter 2 (continued)

- off-highway vehicle 34, 55-57, 76, 82, 88, 96
- old growth 16, 27, 31, 32, 61, 86, 95-99, 101-106
- outstanding natural area 21, 54
- plants, special status 61, 86
- prescribed fire 25, 30, 34, 35, 49, 78, 79, 80, 83, 84, 94, 101, 107, 112, 113, 114
- probable sale quantity 22, 59
- public involvement 1, 76, 80, 93
- recovery plan 45, 46
- recreation 16, 19, 21, 24, 29, 30, 34, 46, 54-57, 62, 66, 68, 70, 75, 81, 83, 87, 88, 90-92, 94, 99, 102-107, 112, 114
- reforestation 60, 85, 86, 101, 104
- research 19, 21, 31, 32, 46, 62, 68, 79, 80, 91, 95, 109, 116, 117
- research natural area 21, 88
- resource program 19, 20
- riparian management area 81, 82, 88, 95-97, 99, 103-106
- Riparian Reserves 112, 117
- riparian zones 31, 81, 87, 95-97, 99, 103, 105
- roads 24, 29, 34, 37, 39, 45, 54, 61, 65, 68, 75, 76, 80, 82-84, 86, 87, 91-93, 95, 101, 102, 104, 109, 111, 115, 116
- rural interface areas 52, 54, 78, 94, 96, 97, 99, 103, 105-107
- salvage 28, 29, 57, 59, 76, 83, 86, 99, 103, 105, 107, 114
- SEIS special attention species 19, 20, 22, 28, 31, 32, 37, 40, 41, 43, 62, 75, 78
- silvicultural practices 59
- site productivity 62, 80
- smoke 34, 78, 80, 94, 113
- snags 17, 28, 29, 32, 33, 37, 38, 61, 83, 86, 95, 98, 102, 104, 106
- soils 21, 22, 32-35, 59, 75, 76, 80, 83, 84, 93, 101
- special areas 41, 46, 49, 54, 68, 70, 87, 91, 92, 95-99, 102, 104-106
- special recreation management area 21, 55, 57, 79, 88, 95, 97-99, 102-107
- special status species 41, 42, 80, 86, 95, 96, 98, 104, 106
- spotted owl 27, 32, 33, 45, 80, 104, 106, 108, 109
- thinning 28, 29, 31, 39, 60, 61, 82, 86, 99, 103, 105, 107, 114
- threatened and endangered species 30, 45, 67, 86, 90, 92, 95-99, 102, 104, 106, 117
- timber harvest 22, 32, 34, 38, 44, 54, 59, 60, 81-83, 86-89, 91, 97-99, 101, 102, 104, 115
- Timber Production Capability Classification 21, 34, 35, 40, 80, 81, 83
- timber supply 31
- vegetation control 83, 94
- visual resources 50, 83, 88, 89, 91, 92, 96-99, 103, 105-107
- watershed analysis 17-19, 21, 22, 30, 31, 32, 37, 40, 42, 52, 75, 78, 79, 111-116
- watershed restoration 17, 18, 26, 30, 35, 115
- wetlands 21, 22, 35, 37, 62, 81, 82, 95
- wild and scenic rivers 16, 21, 24, 50, 51, 62, 70, 81, 88, 96-98, 103, 107
- wilderness 21, 24, 27, 28, 52, 56, 62, 68, 87, 88, 91, 95-97, 99, 104, 106
- wildfire 25, 30, 32, 34, 59, 78, 79, 80, 94, 101, 102, 109, 113
- wildlife 21, 27, 29, 37, 40, 54, 55, 65, 67, 68, 75, 82, 83, 86, 87, 90, 91, 94, 95, 97, 98, 104, 106, 108, 112
- withdrawals 56, 57, 70, 92, 114
- woody debris 17, 26, 28, 29, 30, 32, 38, 76, 78, 79, 82, 87

Index - Chapter 3 Affected Environment

- access 4, 60, 78-90
- air quality 5-8
- American Indians 23, 59, 90
- anadromous fish 80
- analytical watershed 11, 18, 20-22
- animals 23, 35, 51, 62, 84
- area of critical environmental concern 41-44, 55, 60
- back country byway 63
- bald eagle 49
- best management practices 9
- biological diversity 5, 23, 27, 29, 71, 88, 89
- budget 84
- commercial forest land 9
- community stability 84
- consistency 21, 82
- coordination 6
- cultural resources 59
- ecological health 23, 26
- employment 79, 80, 82-84, 86
- energy 4, 25, 36, 49, 78
- fish 11, 22, 39, 49, 53, 54, 80
- fragile area(s) / site(s) 9, 18, 36
- issues 4, 71
- jobs (see also employment) 79, 80, 82, 86
- land tenure 3
- landscape diversity 23, 27
- marbled murrelet 50
- mineral 3, 18, 31, 78
- mitigation 88
- monitoring 6, 8, 20, 41-44, 48-50, 76
- off-highway vehicle 39
- old growth 23-26, 28, 29, 35, 36, 44, 48, 49, 50-53, 71, 88, 90
- outstanding natural area 55
- personal income 79, 80, 82, 84
- plants, special status 41
- prescribed fire 5-8, 38, 88, 90
- probable sale quantity 72
- recovery plan 48, 49
- recreation 9, 11, 18, 22, 27, 59, 60, 63, 70, 80, 82, 86
- reforestation 71, 88
- research 5, 6, 36, 41-43, 55, 84
- research natural areas 36
- revenue(s) 83, 84
- riparian management area 43
- riparian zones 11, 21, 29, 35, 36, 38, 39, 52

Index - Chapter 3 (continued)

- roads 4, 6, 11, 20-22, 36, 38, 39, 51, 52, 54, 59, 60, 63, 78, 84, 88
- rural interface areas 87, 88
- salvage 38, 71, 73
- SEIS Special Attention Species 36, 41, 54
- silvicultural practices 26, 73
- site productivity 71
- smoke 5-8, 88
- snags 25, 26, 38, 43, 53, 89
- soils 9, 18, 20-23, 25, 27, 31, 35, 42, 51, 52, 71, 88
- special areas 55
- special recreation management area 63
- spotted owl 23, 28, 48, 49, 53, 73
- thinning 38, 44, 71, 73, 76
- threatened and endangered species 48-52
- timber harvest 7, 28, 38, 39, 52, 71-73, 80, 83, 84, 86, 88
- Timber Production Capability Classification 9, 11, 18, 27, 71
- timber supply 86
- vegetation control 8
- visual resources 60
- water 4, 5, 9, 11, 18, 20-22, 25, 35, 36, 38, 39, 42, 43, 48-53, 60, 83, 86
- water quality 5, 9, 11, 18, 20, 22, 35
- wetlands 11, 27, 29, 35, 39
- wild and scenic rivers 18, 60, 63
- wilderness 5, 9, 59, 60, 62, 63
- wildfire 6, 7, 23, 28, 53, 71, 88-90
- wildlife 4, 9, 11, 23, 29, 35, 36, 38, 39, 63, 84, 89
- withdrawals 3
- woody debris 20, 22, 26, 35, 44, 52, 53

Index - Chapter 4 Environmental Consequences

- access 25, 26, 27, 29, 30, 40, 73, 74, 75, 77, 94, 98
- adaptive management 6
- Adaptive Management Area 3, 8, 73, 74
- air quality 6, 8, 10, 25, 31, 98
- American Indians 85
- analytical watershed 15, 16, 18, 31
- animals 19, 21, 23, 25, 26, 28, 37, 41, 43, 54, 60
- animals, special status 19, 26, 43
- Aquatic Conservation Strategy 3, 14, 16, 19, 39, 62
- area of critical environmental concern 41, 42, 60, 62, 63, 81
- bald eagle 31, 43, 52, 96
- best management practices 6, 11, 12, 15, 16, 18, 39
- biological diversity 19, 24, 26, 29
- commercial forest land 70
- community stability 90
- Connectivity/Diversity Blocks 13, 50, 64, 72, 74, 75, 76, 77, 80, 94
- consistency 21, 44, 45, 64, 67, 93, 96-98
- consultation 49, 50, 54, 83
- coordination 97, 98
- critical habitat 50, 54, 72, 96
- cultural resources 62, 83
- cumulative effects 2, 3, 7, 14, 15, 16, 18, 24, 30, 31, 33, 34, 36, 37, 38, 40, 43, 52, 53, 56, 59, 77, 87, 97
- ecological health 19, 25
- ecosystem diversity 19, 24
- employment 83, 85, 87, 90, 91, 92, 93
- energy 2, 11, 15, 60, 62, 80, 84
- fertilization 3, 13, 14, 16, 26, 41, 72, 76
- fish 13, 19, 25, 39, 40, 56, 58, 60, 65, 83, 91, 92, 97
- fragile area(s) / site(s) 11, 12, 13, 60, 75
- fuelwood 85
- General Forest Management Area 13, 33, 50, 64, 70, 72, 74, 75, 76, 77, 80, 94
- green tree(s) 26, 33, 34, 59, 64, 73, 74
- herbicides 8, 16, 76
- issues 84, 90, 93, 97, 98
- jobs (see also employment) 84, 87, 92
- key watersheds 3, 16, 72, 80
- land tenure 24, 40, 87
- land use allocation 3, 5, 14, 16, 60, 62, 70, 74
- landscape diversity 19, 25
- Late-Successional Reserves 5, 8, 16, 31, 45-47, 49-51, 62, 64, 71-73, 80, 94
- marbled murrelet 31, 43, 53
- Matrix 8, 13, 16, 59

ER'S CARD

8254 1994 v.1
of Land
Salem District.
District
Source

DATE
RETURNED

OFFICE

(Continued on reverse)

QH 76.5 .07 8254 1994 v.1
U. S. Bureau of Land c.2
Management. Salem District.
Final Salem District
proposed resource

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

